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WAR MEDICINE

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WAR MEDICINE

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RESEARCH SOCIETY REPORTS

THE TENTH SESSION OF THE RESEARCH SOCIETY OF THE AMERICAN RED CROSS SOCIETY IN FRANCE

September 6 and 7, 1918, at the Hotel Continental, Paris.

The first meeting of the Session, September 6 at 2 : 00 P.M., was devoted to a Conference on Surgery in Battle Areas, led by Lieutenant-Colonel Crile. It was followed by a demonstration of splint adjustment by Lieutenant-Colonel Joel Goldthwait, M. R. C.

The second meeting, September 7 at 9 : 30 A.M., was devoted to a discussion of Acute Respiratory Infections. Papers were read by Colonel W. W. O. Beveridge, A. D. M. S. Sanitation, B. E. F., Médecin-Major Borel of the Service de Santé, Major Haven Emerson, M. R. C., and Major H. Zinsser, M. R. C.

The third meeting, September 7 at 2 : 00 P.M., was devoted to a discussion of Field Sanitation. Papers were read by Médecin-Major Octave Monod, Major F. P. Josceline, A. D. M. S. Sanitation, B. E. F., Colonel Henry A. Shaw, M. C., and Colonel Gressinger, M. C..

SUMMARIZED REPORT OF THE CONFERENCE ON SURGERY IN BATTLE AREAS

Leader, Lieutenant-Colonel G. W. CRILE, M.R.C.

Friday, September 6, 1918.

INTRODUCTION.

The great value of the Conference was owing to the fullest participation with American officers of certain military surgeons of the widest experience — including the clinical chiefs for both France

and England. These distinguished officers gave to our cause their counsel and advice as freely and as enthusiastically as if it were for their own armies. Among these were Professor Tuffier, General Sir Anthony Bowlby, Colonel Gask, Colonel Richards, Colonel Soltau, Major Lockwood, Captain Betz and Captain Dehelly.

The conclusions of this Conference were slightly modified in a later Conference with a Committee appointed by the Chief Consultant, A. E. F. The following is the final conclusion.

I. Problems Relating to Organization.

1. What should be the personnel of a standard surgical team?

A. — (*a*) Surgeon.
(*b*) Assistant surgeon.
(*c*) Nurse assistant.
(*d*) Anesthetist (Nurse or M. O.).
(*e*) Two theater orderlies.
(*f*) One striker.

Comment:

(*a*) and (*b*) *Surgeon and Assistant surgeon*: Every surgeon should have an assistant surgeon for two reasons: first, to train the younger men to become competent surgeons; and second, to facilitate work. The assistant surgeon of today is the surgeon of tomorrow. The relation between the surgeon and his assistant should be that of pupil and teacher. A nurse or an orderly may be trained to be as useful a technical assistant as an officer.

When there is a sufficient number of trained surgeons, the nurse assistants or orderly assistants may be used to replace the medical assistants.

(c) *Nurse Assistant:* Were it not for the necessity of training new surgeons, the nurse assistant answers every purpose.

(d) *Anesthetist*: Preferably a nurse, for

1. Each nurse anesthetist adds an officer to the medical corps.

2. The nurse anesthetist has proven satisfactory to the surgeon.

3. The nurse anesthetists should be trained just as surgeons are trained — by acting as pupils to skilled anesthetists. Skilled anesthetists should have pupils until there are a sufficient number of trained anesthetists for the army. Women physicians, trained in administering anesthetics, may be employed. The *degree* of M. D. does not confer qualification to give anesthetics. Every anesthetist, medical or non-medical, should receive adequate training at the expense of the teacher, not at the expense of the patient.

(e) *Orderlies:* Each team should have two theater orderlies, and, if there is shortage of personnel in the forward area, four nursing orderlies and two bearers may be added to a team to reinforce the personnel of the forward unit. Surgeons are of little use if patients cannot be carried. An organization may break at the point of enlisted personnel, as well as at the point of surgical personnel. The quality of work and the quantity of work are dependent on a well-balanced personnel.

(f) *Striker:* The striker is an accessory, but the surgeon's time can be better occupied than in taking care of his own quarters. Disorderly quarters, mess-room and premises adversely affect the work of an organization.

2. **How many tables shall be allotted to each team?**

A. — In ordinary cases, two; in lightly wounded, three or even more. In rush periods, patients need not be removed from the stretcher; they may be operated on the stretcher resting on the table. But few metal tables are required — anything that will support a stretcher will answer. In periods of rush, the time and labor of orderlies must be conserved as well as the time and labor of the surgeon.

3. **What is the best arrangement of hours for a considerable pull?**

A. — When the fight opens and the wounded begin to come in, all surgeons go on duty for the first 4 to 6 hours; then they begin to go off in relays of eight-hour and twelve-hour operating periods.

The following plan has worked out satisfactorily in a longer pull: four hours on and four hours off, excepting the night team, which works straight from midnight to 8:00 a.m. By having two breakfasts, two lunches and two dinners, an hour apart, and at the same hours for surgeons, nurses, and orderlies of the same team, the operating tables may then run continuously.

First Team.		*Second Team.*		*Third Team.*	
On.	Off.	On.	Off.	On.	Off.
8 a.m. - 12 N.	12 N. - 4 p.m.	12 N. - 4 p.m.	4 p.m. - 8 p.m.	12 M. - 8 a.m.	8 a.m. - 12 N.
4 p.m. - 8 p.m.	8 p.m. - 8 a.m.	8 p.m. - 12 M.	12 M. - 12 N.		

4. **What is the best means of transport of teams?**

A. — Ambulance.

5. **Shall teams furnish any instrument or apparatus?**

A. Teams should be self-contained as regards the commonly used instruments, unless the hospital to be reinforced has an adequate excess of instruments.

6. **What shall be the proportion of X-ray operators?**

A. — For each three teams; an operator for the day and an operator for the night would seem to provide sufficient X-ray service.

7. **What shall be the proportion of nurses, not attached to teams, in the operating room?**

A. — Two nurses to supervise the theater in the day and two in the night, for each six teams.

8. **Shall each surgeon be responsible for the after-care of his cases?**

A. — Yes, as far as possible.

9. **Shall there be a day and night chief of surgical service?**

A. — Yes, the chief of surgical service by day, and the second surgeon by night.

10. **Under whose direction shall the resuscitation team work?**

A. — The resuscitation team will work under the general direction of, and in close co-operation with, the operating surgeons. It shall consist of two medical men, two nurses, and two orderlies.

11. **Shall abundant reserves of teams be in readiness?**

A. — There must be kept as many teams in reserve as possible — teams trained to work together. The teams should be promptly exchanged between the front area and the base according to need.

12. **What is the most available type of mobile unit for emergency reinforcements?**

A. — As far as possible mobile hospitals — mobile operating units. When advancing, have reserve mobile units ready, and leap-frog these past the units in operation. Operate, evacuate and leap-frog again. If these mobile units are not available in sufficient number, then make use of the field hospital.

As a policy, except in emergencies, the field hospital should not function as an operating center.

The mobile unit must be *flexible*, must remain *mobile*, must be *expansible* in its operating capacity. Its primary job is to afford great facility for operating. Evacuate every operated case as early as possible. As a rule early evacuation after operation is better than in the third or fourth day, which are the critical days for infection. It is the great virtue of gas and oxygen that evacuations are hastened.

13. **In periods of great activity what cases can be evacuated unoperated from the evacuation hospitals?**

A. — During periods of great activity, when it is impossible to make complete operations at the evacuation hospitals within a safe period of time, the following types should be promptly sent by pre-operation train to the nearest base :

(1) Perforating wounds with punctiform orifices.

(2) Superficial wounds, and those deeper wounds not extensively involving the musculature of the calf, thigh, buttock, and shoulder areas.

(3) Wounds of the face, hands, and feet, not involving tarsus and deep plantar fascia.

(4) Fractures of bones caused by rifle and machine-gun bullets with through and through wounds, and without extensive comminution, marked displacements, or marked swelling.

II. Problems Relating to War Wounds.

1. **In cases suitable for primary closure, it has heretofore been agreed that patients should remain under the care of the operating surgeon until there is sound healing. Are there any new facts suggesting a modification of this principle?**

A. — Wounds should not be closed unless they can be continuously under the care of the operating surgeon until the wound is healed. There are these exceptions: heads, joints, sucking wounds of the chest, abdomens (in chest and joints it may be well to leave skin unsutured). These should be closed, and if they cannot be held until healed, they should be sent on at once rather than evacuated in the third or fourth day when infection is apt to be spreading. If a sutured wound is to be moved at all, it should be moved promptly.

2. **If a suturable case must be evacuated, and if there is opportunity for making débridement before evacuation, shall the surgeon introduce stitches, leaving them untied, or shall the wound be left wide open without stitches placed?**

A. — Put in no stitches unless they are to be tied at once. Untied stitches in a well debrided wound may become infected; infected stitches delay subsequent closure. Inserted, untied stitches are a handicap, not a help, for a delayed primary wound should have its first dressing under anesthesia in the theatre — preferably gas and oxygen anesthesia — and the entire field cleansed under anesthesia, as if for performing an aseptic operation; then and only then should the gauze dressing be removed and the wound immediately closed. Redressing such wounds in the wards usually leads to infection.

3. **Shall debrided wounds be protected by sterile gauze during evacuation? Or shall an aseptic dressing be applied? If so, what antiseptic?**

A. — Dry sterile gauze; paraffined gauze; and, if there is a prob-

ability of two or more days' delay, the peculiar property of flavine which inhibits bacterial growth is an advantage; hence, in such cases, gauze wet with 1/5000 flavine is good. Studies are being undertaken with other methods which may modify the foregoing.

4. **Shall wounds be packed with gauze?**

A. — Loosely dressed with gauze, yes; *packed* with gauze, never. Dry gauze should be placed in contact with every part of the raw surface, for it absorbs toxins, bacteria and wound secretions, hence aids the wound in its defense against infection.

5. **Shall splints be placed on limbs having wounds of the soft parts only?**

A. — In extensive wounds, yes, not only because they provide comfort and physiologic rest, but also, if nerves or tendons have been severed, they are less displaced.

6. **Is a bacteriologic examination of the wound required in making primary suture during the period of contamination, which usually lasts from 10 to 12 hours?**

A. — No. Clinical judgment is sufficient in primary suture.

7. **If, owing to rush, no surgical treatment of a wound can be given before evacuation, shall the wound be covered with dry sterile gauze only? Shall any antiseptic be used? If the latter, what antiseptic?**

A. — Make no instrumental, no digital examination of the wound. Place no drain tubes, no gauze, no foreign body in the wound. Apply dry sterile gauze dressing. It may be worth while to apply alcohol, picric acid, or iodin on the skin only.

8. **If there is a larger number of wounded than the surgeon can give a complete débridement, shall he complete as many as he can, leaving the remainder of the wounded unoperated, or should he perform an incomplete operation on every wounded man?**

A. — The adage that "Anything worth doing at all is worth doing well" applies here. Under these circumstances, the surgeon should give his time to those patients on whom operation is likely to result in recovery; and those who, if unoperated, are not safe for evacuation. In stress, the surgeon should do only work with greatest net profit.

It has been shown that wounds of the soft parts, including compound fractures, may be remarkably well reclaimed up to and into the third day. The reclamation is made through complete revision, just as in the wounds at the front — just as acute appendicitis is reclaimed up to the period of new tissue formation and abscess.

Do well as much as possible; evacuate the rest.

At the beginning of a fight, there is a tendency to hold too many cases at the front hospitals. Evacuate as quickly as possible. Evacuate the earliest cases liberally. "Don't be selfish and try to do them all in the front area. Remember the surgeon back at the base is ready for work. The cases must be sent back in any event. Send all that can travel. Keep abdomens, chests, joints, amputations, and shock cases."

An added reason for a liberal evacuation of unoperated cases at the opening of the battle is that a larger number of surgeons will thereby enable the greatest number of patients to receive prompt operation.

9. **In battle stress, shall the surgeon with ripest experience and most mature judgment do operations, or shall he utilize his experience and judgment in making important decisions; in advising less experienced operators; in directing treatment of critical cases; in deciding the schedule of operating — in short, acting as a surgical manager, operating with his head, not his hands?**

A. — There should be a surgical manager, not necessarily the best technical surgeon, but the man with the best judgment.

10. **Shall the wounded receive morphia?**

A. — Give morphia for pain and for great restlessness. If time permits, give quarter grains and repeat rather than start with half grain. Always ticket the time and the dose on the man.

III. Problems Relating to the Lightly Wounded.

1. **Shall the lightly wounded be segregated and dealt with independently of the seriously wounded?**

A. — In large fights, the lightly wounded should be separated at the triage and sent directly to an advanced hospital especially set aside for their treatment, or sent to the base at once.

2. **Shall they claim the attention of the best surgeons under the best conditions, or otherwise?**

A. — The organization for the care of the lightly wounded should be made by one of the best surgeons, although the actual work may be done by those of less experience.

ACUTE RESPIRATORY INFECTIONS

Considerations in the Prevention of Respiratory Affections. By Colonel W. W. O. Beveridge, C. B. D. S. O.

The speaker said in part :

The spread of infectious diseases affecting the respiratory tract is influenced in army life by a variety of circumstances of which overcrowding is probably one of the most important.

Overcrowding has always been recognized as a prominent factor in the spread of disease both in civil and military life. In England as long ago as 1861 the Royal Commission for Improving the Sanitary Condition of Barracks commented as follows :

" Before the soldier can be assured of having the amount of space required for health, there must be a distinct recognition that the amount given by regulation (i. e. 600 cubic feet) is on no account to be tampered with. No increase of regimental strength, no want of store rooms, libraries, or reading rooms, should for an instant be permitted to interfere with it.

" It would never be pleaded, as a reason for reducing the soldier's ration of bread and meat, that a larger number of men had oined the regiment than the commissariat could provide for.

" Why should the soldier's air ration, which is equally important for his health and efficiency, be differently dealt with?

" In any case overcrowding should utterly be put an end to.

" They have not been aware that, if above a certain number of men are placed in a given cubic space, the lives of some of these men, and the health of others, is certain to be sacrificed. "

Accordingly during the period prior to the war accommodation in barracks and hutments in Great Britain was provided on the scale of 60 square feet and 600 cubic feet per man. On the outbreak of the present war the great influx of recruits necessitated a somewhat less generous provision, and having regard to military exigencies 40 square feet or 400 cubic feet was fixed as the minimum accommodation which could safely be permitted in quarters. This has since come to be regarded as a war time standard which every effort should be made to attain.

All epidemiological experience points to the very marked effect which overcrowding exerts upon the spread of infectious diseases, especially those affecting the respiratory tract. It is a matter of common knowledge that when diphtheria occurs among men who are crowded together, " carriers " of Klebs-Loeffler bacilli are usually numerous, and when these men are spread out in well ventilated quarters the " carrier " condition rapidly disappears.

The evil effects of crowding together in ill-ventilated wards, patients suffering from measles, are well known; the severity of the disease increases, and deaths from pneumonia as a complication may reach a high figure. Should such a state of affairs occur, experience has shown that it can be immediately remedied by the simple procedure of providing sufficient space and adequate ventilation.

Similary outbreaks of cerebro-spinal fever depend largely upon overcrowding and ill ventilation. Many such outbreaks have been checked by remedying these conditions. At a meeting of the permanent section of the Allied Sanitary Conference in June, 1917, Professor Rho (Italy) stated that during a volcanic eruption 30,000 men were placed under canvas for a long period during cold and inclement weather They were not overcrowded and enjoyed complete freedom from cerebro-spinal fever, although an outbreak of this disease was raging in barracks in the vicinity which were manifestly overcrowded. In this connection an interesting and important investigation into the relationship which exists between overcrowding and the meningococcus carrier rate has recently been carried out by Captain J. A. Glover, R. A. M. C., in England. The conclusions which he arrives at are definite and quantitative and afford a useful confirmation of the conclusions which have been arrived at in the past by epidemiologists and others as a result of experience and observation. Captain Glover points out that a high carrier rate of virulent meningococcus strains is probably one of the chief factors tending to produce outbreaks of cerebro-spinal fever so that a high incidence of carriers may reasonably be taken as an index to the likelihood of an outbreak occurring, other conditions being favorable.

By the simple expedient of allowing a space of 2 1/2 feet between each bed and by improving the ventilation of the quarters, the carrier rate, in one instance, fell from 28 to 2 per cent in 9 weeks, from 28 to 7 per cent in 6 weeks in another, from 38.5 per cent to 4.5 per cent in 6 weeks in a third, and from 28 per cent to 4.5 per cent in 5 weeks in a fourth.

A large number of similar experiments were carried out, all of which support the view that the distance between beds is of paramount importance and that quite a moderate degree of " spacing out " of beds combined with simple methods for improving ventilation is highly effective in reducing carrier rates.

Infectious diseases affecting the respiratory passages are largely spread by " spraying " from the nasal and buccal orifices of infected persons, so that the chances of a healthy person in the neighbor-

hood becoming infected increases enormously the nearer such a person is to an infected individual. In addition, inadequate ventilation permits of a greater concentration of infective material in the surrounding air which increases the chances of transmission of infection. The important elements in " overcrowding ", so far as the spread of infectious diseases affecting the respiratory passages is concerned, are, therefore, proximity of heads and defective ventilation. Ventilation may be improved within the limits short of creating a draught, but satisfactory results can only be expected when close proximity of heads is also prevented.

Proximity of heads and degree of ventilation are, therefore, the criteria by which the adequacy of accommodation should be judged.

Floor space may not give trustworthy information as to the actual available accommodation; the presence of doors or awkward angles in rooms may lead to overcrowding, although the total floor space, if it were all available, would be adequate.

In calculating cubic space in quarters, heights above 10 feet are neglected as not contributing useful space so far as the prevention of true overcrowding is concerned. In hutments the cubic space above 10 feet from the floor is usually relatively small and for practical purposes may be neglected. On this basis the floor space expressed in square feet is numerically 1/10th of the cubic space, so that accommodation may, for simplicity, be expressed in terms of square feet of floor space. Where huts are about 20 feet wide, as is commonly the case, and men sleep down each side the linear wall space per man is numerically a tenth of the floor space per man and affords a ready and rapid guide as to the sufficiency of accommodation. In ordinary hutments, therefore, 400 cubic feet or 40 square feet of floor space or 4 linear feet of wall space per man may be regarded as affording the same accommodation.

Quite apart from convenience of measurement, linear wall space gives information in regard to the most important factor in accommodation, namely proximity of heads. It sometimes happens, for instance, in circular huts and shelters that it is impossible to give what is usually considered an adequate amount of floor space but that there is no difficulty in providing a suitable amount of wall space, thus ensuring a satisfactory distance between heads. In addition to adequate spacing between heads, it is of course desirable to obtain as much floor space and cubic space as possible, but where owing to military exigencies this cannot be done every endeavor should be made to obtain a sufficient amount of the most essential factor in the prevention of overcrowding, namely wall space.

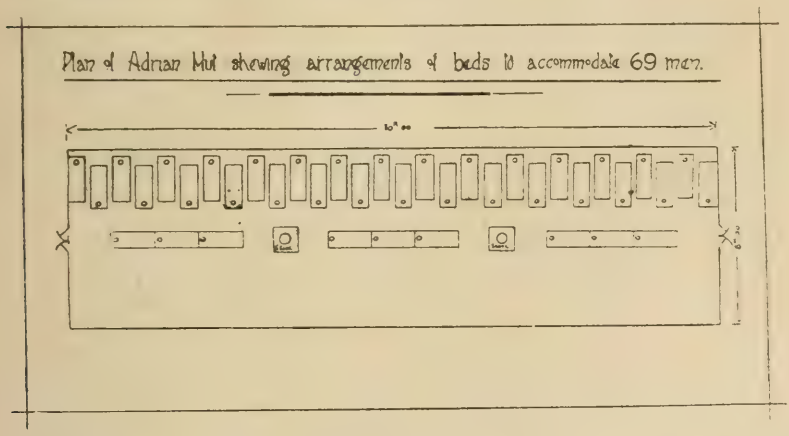
Accommodation in tiers is not recommended where it can be

avoided: it may be necessary in forward areas but in no case should more than two tiers be countenanced unless for very short periods and on grounds of military urgency.

Hutting accommodation for the British Army on the Lines of Communication in France is provided on a basis of 4 feet of wall space per man, unless the huts are more than 20 feet wide, when 40 square feet of floor space per man is allowed. This includes accommodation for Labor Companies, both white and colored, and for prisoners of war and their escorts. Vigilance is exercised in preventing more men than the authorized number from being accommodated in any hut, particularly in the case of colored laborers who are specially susceptible to respiratory diseases.

In ordinary hospitals 60 square feet of floor space with six feet of wall space per patient is provided, but during periods of pressure this may have to be reduced to five feet of wall space. In hospitals for infectious disease 100 square feet of floor space is allowed.

Several types of huts for the accommodation of troops have been erected, the majority of which vary from 16 to 20 feet in width.



The Adrian Hut is constructed in sections of 2 meters length which can be bolted together. Its extreme width at floor level is 27 feet 4 1/2 inches. A hut 30 metres long can accommodate 69 men giving each approximately 40 square feet of floor space, if the precautions referred to below are observed. Thirty beds could be placed down each side, and owing to the great width of the hut 9 can be arranged end to end down the centre. In order to make the best use of the available floor space it would be necessary for alternate men in the beds along the wall to sleep with their heads projecting towards the centre of the room. This arrangement

could still be further improved by drawing alternate beds one foot away from the wall (see figure). To ensure this arrangement being adhered to, it would be necessary to fix the beds to the floor and to make the head end of each bed slightly higher than the foot end so that men would be constrained to sleep with their heads at the proper ends. The difficulties of carrying out these refinements in actual practice are obvious. It has also been suggested that risk of spread of infection might be diminished by the erection of small partitions or screens between each bed.

In army areas variations in the patterns of hut have lately been restricted for the sake of simplicity and convenience; the following are typical examples of huts utilized in army areas as shelter for troops.

Adrian Huts . . .	30 meters.	Men or Institutes.
Standard Hut . .	60′ × 16′.	Men or Institutes.
Nissen Bow. . . .	26′ 10″ × 15′ 8″. . .	Men.
Nissen Steel Tent. (Circular). . . .	Diameter 14′ 6″ 1/2.	Men.

The Nissen Steel Tent is intended primarily for use in forward areas for the purpose of providing shelter for men, and is designed to replace the ordinary bell tent for winter occupation. It can readily be erected, dismantled and re-erected elsewhere. Essentially the Nissen Steel Tent is a circular structure with walls consisting of 20 sheets of corrugated iron arranged on end vertically. Lateral junction is effected by means of metal grooves in which the sheets slide. The roof is conical and is composed of sections of sheet iron fitted together on rafters; it is also furnished with an inner lining of sheet iron. A ventilator is provided at the apex. The door consists of a single sheet of corrugated iron 2′ 3 1/2″ wide, and two oiled linen windows which can be opened are let into corrugated panels on opposite sides of the tent. The floor is made of wood. The diameter of the steel tent is 14′ 6 1/2″, about 2 feet more than an ordinary bell tent. The tent accommodates 11 men, allowing 4 feet of wall space to each, which is greater than that usually given to men in ordinary bell tents. The cubic capacity of the steel tent is also considerably greater than that of a bell tent, owing to its high vertical sides.

Ordinary circular bell tents, diameter 12′ 6″, usually accommodate not more than 12 men, but on occasion 14 men may be placed in a tent. The wall space, floor space, and cubic space are thus below the standard prescribed for hutted accommodation. In warm weather when the tent flies are kept open,

this is partly compensated for by free ventilation, but during wet and cold weather when the tent is closed the conditions both in regard to proximity of heads and ventilation are such as would favor the spread of disease affecting the respiratory passages. Owing to the men being grouped in separate tents, the danger of spread of disease is limited and the risk of an extensive outbreak is not so great as if the same degree of overcrowding occurred in a large hut or barrack room.

It is obvious from what has already been said that overcrowding is a relative matter and no definite line of demarcation can be drawn between ample space and overcrowding; the two merge gradually into one another. For practical purposes, however, a compromise between military necessity and the ideal has to be made. The minimum standard of accommodation already referred to represents the practical compromise which has been effected: less accommodation than this increases enormously the chances of spread of infectious disease affecting the respiratory tract.

The speaker alluded briefly to some other factors which have a bearing on the spread of respiratory diseases.

The procedure adopted in dealing with contacts and carriers varies somewhat according to circumstances and to the disease in question. Cerebro-spinal fever and diphtheria may be regarded as infectious respiratory diseases and the mode of dealing with contacts and carriers of these diseases may be briefly considered.

Contacts with a case of cerebro-spinal fever are submitted to a bacteriological examination with a view to discovering carriers. All contacts who give negative results are released; those who give positive results are detained and suitably treated with antiseptic douches or sprays until two successive bacteriological examinations at several days' interval are negative.

Contacts with a case of diphtheria are examined bacteriologically and all carriers isolated in roomy well-ventilated quarters until bacteriological examination gives negative results. In addition local treatment of throat and naso-pharynx may be required. Specific prophylactic measures, such as the administration of antidiphtheritic serum to contacts, are not usually undertaken. Very few contacts or carriers if properly isolated and treated develop diphtheria, and, since they are kept under observation, any who might develop clinical symptoms would immediately receive a curative dose of anti-diphtheritic serum. Schick's reaction makes it possible to detect those in whom natural immunity is low and a degree of active immunity can be induced by the administration of neutralized diphtheritic toxin. This procedure is, however, hardly adapted for

general use in the field, and in view of the ease with which outbreaks of diphtheria can be controlled by the simple precautions already described, specific prophylactic measures have not been found necessary as a routine procedure.

In conclusion it may not be out of place to refer to certain general considerations which are important in so far as they aid in maintaining resistance to infection. Protection against cold and inclement weather in the shape of warm and waterproof clothing has a marked effect in preventing a lowering of resistance, and in this connection the importance of providing efficient drying rooms at all camps and billeting areas cannot be overemphasized. Such drying rooms may be heated by coke or coal stoves, or the heat from incinerators may be utilized.

In order to maintain resistance to disease and to mitigate its severity when contracted, a sufficiency of good and well-cooked food is essential. The British Field Service Ration provides a daily energy value of rather more than 4,000 calories and contains 166 grams of fat, a highly important food element. There is no doubt that this adequate diet has a material influence in maintaining resistance to disease and is in part responsible for the low incidence of respiratory diseases throughout the British Armies in France.

Acute Respiratory Infections Among the Colored Troops in the French Army. By Major BOREL, Service de Santé.

The speaker said in part :

The conditions of war necessitating recruiting and transportation of the colored troops of the A. O. F. to France have enabled us to establish the fact that these contingents have become perfectly acclimatized; indeed no serious result from a sanitary point of view has been observed as a result of this transportation.

Thanks to measures taken in the colony and to the hygienic care with which these colonials were protected in the camps of instruction, there was nothing abnormal in their general health condition. Pulmonary infections, pneumonia, and tuberculosis were alone responsible for a certain number of victims.

In their native land pneumonia is relatively frequent among these troops. Even during the warm season they are liable to colds and pneumonia. In Senegal veritable epidemics in the barracks have been reported and there have been cases on the transports carrying the troops to France. Some cases of diarrhea and a considerable number of pneumonia have been reported during the months following their arrival.

When the troops reach France in the cold and rainy season, and during the first winter, cases of serious pneumonia are numerous; veritable epidemics with a considerable mortality are often observed.

In March and April of 1917 the following observations were made in a single battalion:

Morbidity.	130 per cent.
Mortality.	33 per cent.

In the course of these epidemics we had occasion to observe the most numerous and varied forms of pneumococcic infection: acute bronchitis; pulmonary congestion; broncho-pneumonia; and common pneumonia. All the usual complications, such as pleurisy, pericarditis, and meningitis were also observed.

The pneumococcus was the organism found to be the causal agent.

Acute Bronchitis: The clinical characteristics are essentially the same as in the case of Europeans. Upon auscultation sonorous and crepitant rales are heard. The evolution takes place in two weeks (in the case of the Blacks the persistence of rales is more noticeable, and there is a tendency to relapse).

Acute Pulmonary Congestion presents itself most frequently in the form of pleuro-pulmonary congestion with a moderate fever of 38 to 39 degrees C. and, concomitant with infection of the pleura, there are pleural friction sounds in addition to sub-crepitant rales.

In the case of the Blacks the broncho-pneumonic forms are frequent.

a. A sub-acute type with fatal prognosis.

b. An acute type lasting 8 or 10 days.

c. A prolonged type similar to pleural tuberculosis.

Frank pneumonia of the regular type is the most frequent form observed among the Blacks (60 per cent of the cases are due to the pneumococcus). This organism is almost always present in the blood as determined by hemoculture.

Clinical Peculiarities: In pneumonia of the lobar aphonic variety pectoriloquy is constant. This is a helpful symptom in determining the seat of the infection.

There are serious forms frequently observed among the Blacks, such as sudden and total pneumonia. Pneumonia of a prolonged variety ending in suppuration is frequent. Pleural and pericardiac complications are also observed.

Dry pleurisy and sero-fibrinous pleurisy with slight discharges are usually not serious, but purulent pleurisy has a much less favorable

prognosis. Metapneumonic pleurisy develops frequently after the crisis.

Pericarditis : Purulent pericarditis is the form usually observed, with false fibrinous villous membrane adherent to the chest wall. This frequently occurs after a period without fever.

Meningitis is a somewhat frequent complication with pneumonia or broncho-pneumonia.

With the arrival of battalions in France the following observation is usually made : after every arrival of transport there is an epidemic outbreak of a more or less serious nature which continues for a considerable time, and the presence of the pneumococcic organism is not determined until there have been a certain number of victims. In 1916 Médecin-Major Kerandel, who had observed this fact, conceived the idea of carrying out vaccination among the colored troops by the methods advocated by Wright and Lister. As a result of favorable experiments M. Kerandel, at the Pasteur Institute, took up the study of the pneumococcus obtained from certain fatal cases among the Senegalese and succeeded in preparing a vaccine.

A mission composed of Doctors Lafforgue, Kerandel, and the speaker was sent to the camp of..., and they determined to vaccinate three battalions, leaving half of the effectives as controls.

The vaccine was made up of dead organisms from centrifuged, 24-hour cultures, in a liquid medium, suspended in physiological water in the dose of four billions per cubic centimeter.

The doses injected were :

1/2 cc. (or 2 billions)
1 cc. (or 4 billions) 8 days later.

No reaction, either general or local, was observed among those vaccinated. In tabulating the results a distinction was made between those who had been in France from one to three years and those who had been present only a month. It was at once possible to observe that the morbidity rate among the controls varied greatly.

23 per cent among those who had been from two to three years in France.

92 per cent among those newly arrived.

In the case of the newly arrived the following facts were observed :

In the 39th battalion	35 per cent among those vaccinated	(no deaths)
" " " "	50 per cent among the controls	(no deaths)
In the 95th battalion	36 per cent among those vaccinated	(no deaths)
" " " "	130 per cent among the controls	(7 deaths)

In the 96th battalion	73 per cent among those vaccinated	(1 death)
" " " "	85 per cent among the controls	(7 deaths)

Observations, based upon a careful study of all the pneumococcic cases in hospital, indicate that the result of vaccination was perfect in the 95th battalion; mediocre in the 96th; and nul in the 39th. How can this difference in the results from the vaccination experiments be explained? At this point the idea of groups must be taken into consideration. In 1913 Dochez and Gillepsie demonstrated that groups of the pneumococcus could be classed according to frequency into groups I, II, III, IV, etc. These groups were altogether specific and could be agglutinated solely and respectively by their specific sera.

The same conclusions were reached by Lister almost at the same time, for he distinguished in South Africa the groups A, B, C, D., etc., also classed in the order of frequency as causal agents of pneumonia observed in South Africa. In homologous test Lister established the fact that American type I corresponded to C. African; type II to B. African; type III to E. African.

Type A., the most frequent in South Africa, has no homologue in America.

These groups were established on the assumption that an organism of group I does not immunize against an organism of group II, and vice versa. Agglutination is also strictly specific.

We have studied a certain number of microbes isolated among the Senegalese in fatal cases, keeping the groups in mind.

We have immunized hares and have tried the serum with regard to agglutinability. Eleven sera were prepared and tried out upon twenty-two organisms isolated among the blacks and two among the whites. From these experiments it was observed that the organism 24 was especially interesting. It agglutinates itself with eleven organisms isolated among the colored troops. Considering the frequency of organisms of this group among the Blacks, it may be stated that it corresponds to the A. type of Lister. It corresponds in frequency to the American type I and the African type A.

Professor Nicolle at the Pasteur Institute has carried out certain experiments as to the homologous nature of the serum, from groups I, II, III (American) and the serum of organism 24 and the serum of organism 312.

Serum 312 agglutinates organism of type I and II (American).

Serum 24 (Senegalese) agglutinates no white organism, and organism 24 is not agglutinated by the sera of I, II, III or 312.

It is, therefore, a special group which appears to us especially

interesting, and this must be especially considered in the vaccination of the colored troops.

This group conception complicates exceedingly the problem of pneumococcic vaccination, especially until a polyvalent pneumococcus has been found which will immunize against all the other pneumococci.

From a practical point of view, in continuation of our experiments in pneumococcic vaccination among the Blacks, we prepared last year a vaccine with the three organisms which, as we have seen, agglutinated all the organisms isolated from the colonial troops : 24, 23, 312.

In 1917, at one camp 3,500 were vaccinated and 3,500 were kept as controls.

The result was unexpected: out of the 7,000 men on whom the experiment was tried, there were only two deaths from pneumonia and one death from meningitis among those who were vaccinated, and one death from pneumonia among those who were not vaccinated.

Our experiment merely demonstrated that in spite of a somewhat severe winter, 7,000 men, who had already been acclimated for two or three years, were immune to such an extent that only two deaths resulted from pneumonia.

This confirms the belief already entertained that a considerable immunity was conferred by acclimatization.

Senegalese who had been in contact with the pneumococcus for one year and who had gone through epidemics at the time of their arrival in France were, it appears, spontaneously vaccinated.

During the same period we vaccinated a Malgache contingent of 600 men, who arrived in the month of January, 1918, in the midst of an epidemic of pneumonia.

300 vaccinated with 3 injections (28 billions of microbes) :

Result : one light case of pneumonia and no death.

300 controls :

Result : 16 serious cases of pneumonia and 4 deaths in the two months of observation.

In this instance vaccination appears to have given a perfect result. It therefore seems that pneumococcic vaccination should be continued.

We intend to continue our studies, and already have obtained a serum from organism 24 isolated from the colonial troops. We shall attempt to make the injection as early as possible in the battalion infirmaries without awaiting arrival in the hospital.

It is greatly to be desired that the study of this question of pro-

phylaxis and of treatment of pneumonia should be pursued in common and that the races represented in the colored contingent of the American Army should be compared and homologued with the pneumococci found in the French colored battalions. In this way prophylaxis and serotherapy would be greatly facilitated. The choice of the pneumococcus which should be employed in producing vaccines and sera evidently must vary according to the country and the race.

In America it is group I of Dochez which is chiefly to be considered. In South America it is group A. of Lister. Among the Senegalese it is organism 24.

The Experience of the American Expeditionary Forces with Respiratory Infections. Major Haven Emerson, M. R. C.

The speaker said in part :

Respiratory infections are understood to be those diseases which are passed by the moist discharges from the bronchi or trachea, the throat, and the nose and mouth, i. e., the saliva and spray. Of the diseases included in the nomenclature of the sick and wounded reports of the A. E. F., the following eleven diseases are considered respiratory infections for the purpose of this paper : —

A.	B.
Mumps	Bronchitis (acute)
Measles	Influenza
Scarlet fever	Pneumonia (lobar)
Diphtheria	Tonsilitis (acute)
Meningitis (meningococcus)	Pneumonia (broncho)
	Pharyngitis (acute)

Rhinitis and laryngitis are not mentioned since they are so rarely included in the sick and wounded reports as having resulted in hospitalization.

Sinusitis, otitis and the various secondary involvements commonly following upper respiratory tract infections are not included because such inclusion would at once take the discussion too far afield and involve us in too many clinical and pathological uncertainties as to origin of infection.

It will be noted that the eleven diseases listed fall naturally into two groups : (A) including diseases commonly recognized and feared as communicable, and against which well-considered and logical measures are generally and effectively employed ; (B) representing diseases which people have always considered as afflictions of fate, for which no particular individual is responsible, and

against which no well defined measures are worth instituting, or are likely to prove effective. The order in which the two groups are listed above is the order for each group according to the number of days lost from hospitalization of each disease.

Not less than 50 o/o of the diseases in group A are properly attributable to the conditions of overcrowding on the transports from the United States and in camps at Base ports, not less than half of all the cases so far reported occurring at the Base ports or within such period after embarkation in England and France as to prove that the infection must have taken place prior to debarkation or in the holding or " rest camps " at the Bases.

The incidence rate for pneumonia per 100,000 troops parallels so closely the rate of the other diseases under consideration that the rate of this disease can best be used as a basis of comparison between the experience of the British Armies in France and that of the A. E. F.

Case Rates of Pneumonia per 100,000 Men Strength per Month.

A. E. F.	1917	B. E. F.	A. E. F.	1918	B. E. F.
	January . . .	8.67	392.3	January	17.16
	February . . .	25.27	155.3	February . . .	5.65
	March	14.58	163.9	March.	10.11
	April.	10.40	59.	April	11.80
	May	8.93	16.5	May.	7.65
	June	6.23	82.2	June	10.24
66.6	July	7.35	44.6	July	
26.9	August. . . .	4.68	40.7	August	
20.4	September . .	3.49			
70.21	October . . .	5.68			
66.0	November . .	6.65			
213.3	December. . .	7.55			

With the exception of the incidence of pneumonia among our colored troops and service regiments, which has been about ten times the rate among the white A. E. F. troops, there has been no selective susceptibility of race shown by a study of the figures.

For pneumonia as for the other respiratory infections, here, as in civilian experience at home, crowding and close personal contact and exposure while suffering from lowered resistance, due to a variety of unfavorable conditions of occupation and environment, is apparently the dominant and in many instances the sole determining factor in causing the serious increase of respiratory infections among our troops in France.

Of the 1,613,500 days lost in the A. E. F. up to June 1st, 1918, from all causes — sickness, accident, injury in action and other traumatisms — 1,481,000 days or 91.78 o/o were lost because of sickness.

Of the total loss of days due to hospitalization from sickness 631,226 days or 42.61 o/o were due to the eleven respiratory infections under consideration. The total case incidence of these eleven diseases by months from June 1917 to August 1918 has been as shown in (A), and the rate per 100,000 troops in the A. E. F. as shown in (B).

1917	A.	B.	1918	A.	B.
June	31	221	January	16,843	8,637
July	752	5,013	February	14,412	6,185
August	913	3,126	March	10,135	3,519
September	1,203	2,455	April	6,145	1,934
October	2,798	3,781	May	3,102	571
November	6,925	6,528	June	2,999	1,708
December	12,749	8,499	July	11,096	1,131
			August	12,457	969

The striking effect of the epidemic of influenza coming at a time of year when other respiratory infections are usually at their minimum is shown in the sudden increase in rate in June.

In December 1917 and January 1918 the A. E. F. lost 113,244 days on account of sickness in hospital from these particular diseases, with a mean strength of 172,876 men, or 65 days per capita. With a force of 2,000,000 men and the same incidence of the diseases, we shall need 21,666 beds continuously for these two months to care for these diseases in the coming winter.

Based on the experience of the past 15 months (112,560 cases) we find the average number of days lost for each case of the diseases respectively to be as follows: —

Pneumonia (lobar)	22.7 days.
Meningitis (meningococcus)	20.7 "
Scarlet Fever	14.8 "
Mumps	12.0 "
Pneumonia (broncho)	11.7 "
Measles	10.3 "
Diphtheria	7.2 "
Bronchitis (acute)	6.3 "
Pharyngitis (acute)	4.3 "
Tonsilitis (acute)	4.1 "
Influenza	3.4 "

The above average of days lost for each disease is based on the total number of cases admitted to hospital and the total days lost from service from each disease.

Among the causes which are known to have contributed to the high incidence of the diseases in question are: —

Crowding in camps while awaiting, or in trains en route for, embarkation at U. S. Ports.

Crowding, inadequate ventilation, insufficient medical inspection, and isolation facilities on transports.

Crowding at ports of embarkation (in one instance the floor space per capita being only 8 sq. ft. in barracks).

Crowding in barracks throughout France, twenty square feet and 200 cubic feet per capita being the official allowance in regulation barracks with double tier bunks (British and French provision except in front areas being 40 sq. feet and 400 cubic feet per capita).

Exhausting drilling beyond the point of reasonable fatigue.

Working and sleeping sometimes in wet clothing and shoes.

Eating of food served cold, and without shelter from cold and wet while eating.

Insufficient blankets for warm sleeping.

Practice of awaiting complaint of sickness by men instead of searching constantly for early cases of infections with coughs, colds, and other early symptons, and segregating them for observation, and if necessary for hospitalization.

Habitual neglect of open window ventilation of barracks at night in cold weather.

Spitting promiscuously in and around barracks, mess halls, kitchens, etc., and failure to protect the nose and mouth when coughing and sneezing among groups of men.

Some of the unfavorable conditions responsible for the high rate of respiratory infections are the inevitable result of the conditions of transportation on sea and land imposed by military operations and the imperative requirements of speed in troop movements.

Some are the result of limitations in labor and materials for the construction of shelter buildings for sleeping and eating.

Some result from lack of imagination on the part of medical officers, whose experience has been chiefly in private practice where the prevention of disease in the individual from spreading to the community, as a group of contacts, has been subordinated to the treatment of the patient who comes with a complaint of symptoms.

Some have been due to lack of discipline, in matters of personal hygiene, of the men in barracks, billets, and tents, owing to the indifference or disregard by line officers of the warnings and advice of medical officers.

Whatever may be the limitations of space or shelter, conveyance or crowding, imposed by the prosecution of the war, there is much that can be done at once by a determined effort to remove every least accessory embarrassment or hindrance to the protection of

the enlisted men of the A. E. F. from preventable respiratory infections.

The following plan of action is suggested as capable of adaptation to the needs as they are now found in France. Fix as the minimum floor space per capita for sleeping quarters 40 square feet wherever the billeting or allotment of barrack space can be controlled.

Wherever the number of men ordered to occupy barracks or billets exceeds this ratio the following resources should be used : —

a. Thinning out by providing tentage or makeshift outdoor shelter with increase of blanket allowance to those outside of buildings.

b. Alternate head to foot arrangement of men in bunks with such supervision as will insure the observance of this order. (The British have found it necessary to fix the bunks to the floor and lower the foot of bunks several inches to insure observance of the head to foot order).

c. Where heads are unavoidably at same end of closely adjacent bunks, the arrangement of partition by wood or paper for 2 feet down from head of bunk to prevent spray infection.

Everywhere : —

a. Provision for bathing facilities with hot water, drying rooms for shoes and outer clothing, food served hot and under shelter from cold and wet, and boiling water for rinsing cleaned mess kits.

b. Policing of barracks regularly at night to insure free continuous flow of fresh air through open windows in all barracks and billets.

c. Search for early symptoms and physical signs of catarrhal affections of eyes, nose, throat and chest and taking of temperatures in suspicious cases, with segregation of hospitalization without waiting for well declared cases of infection.

d. Removal of common drinking cup from Lyster bags and other water supply points and discontinuance of the habit of sucking water from the up-turned nipple of the Lyster bag.

e. Avoidance of drilling tired men especially when infection is prevalent and during periods of severe weather.

Many studies of the epidemiologists indicate that reduction of resistance by fatigue, cold and hunger is as important as contact in causing spread of pneumonia.

Every resource which ingenuity and determination can provide must be used to overcome the handicap of crowding.

The avoidance of severe wastage of man power this winter from respiratory infections is worthy of the best brains and most devoted service of the Medical Staff.

Acute Respiratory Infections. By Major H. Zinsser, M. R. C.

The speaker said he had almost nothing to say about mumps, because he had never made the slightest headway in trying to stop it, and he had come to the conclusion that mumps can be controlled only when we have found a more active bacteriological solution. Fortunately, it is very mild and does not cause a great deal of serious loss.

Pneumonia was very serious in the U. S. when encampments first started. Among other things he noticed a curious change in the character of the disease : whereas, at first, a pneumococcus infection was predominant, later the speaker had seen it change to a streptococcus infection.

All these respiratory diseases should be classified for sanitary purposes in a way different from that in which they have been classified up to the present. The speaker believed we should distinguish between those diseases in which the preventive problem is that of avoiding contact, and those diseases against which we encounter a considerable amount of resistance. In the former class, the problem is that of preventing contact; in the second series it becomes primarily a susceptibility problem or hygiene problem.

The speaker said he would classify as lobar pneumonia all pneumonia caused by pneumococci.

In pneumonia, we are not dealing primarily with a contact problem, but primarily with a hygienic, and secondarily with a contact, problem.

He believed the idea of preventing contact originated in Denmark where, some years ago, a physician isolated his pneumonia cases.

Recently the authorities have sought whether two cases in contact with each other presented the same type of pneumococcus. Examination showed that the bacillus was conveyed from person to person; similar cases have been found in members of the same family.

A tent study of pneumonia in a camp showed a considerable number of cases which seemed attractive for the contact theory. On the other hand, the speaker had found that though they frequently came from the same tent, these cases were not very often of the same type of pneumococcus. In the same tent he had sometimes found a type 1 and a type 2, or a type 1 and a type 4, so he could not logically conclude that he was dealing with a purely contact infection.

One of the artillery companies of this camp was sent at a certain

time to a shooting rank. This company arrived while the weather was fine but very soon it began to rain and get very cold, and the shelter was insufficient. After a short time there was an outbreak of pneumonia which amounted to a considerable number of cases, at least eight in a period of 3 or 4 days. These cases were not all of the same type; among them were 2 type 1, 1 atypical 2, 1 type 2, 1 streptococcus type, etc. The associates of these men, 25 in number, were examined for mouth organisms and we found 1 type 1, 1 type 2, 2 atypical 2, 1 streptococcus and influenza, 1 streptococcus, 1 type 4, etc. The point this illustrates is that in order to get lobar pneumonia it is necessary to get pneumococcus in the part affected.

The general conditions, hygienic and sanitary, which reduce the resistance of individuals, are important considerations: what happens in an outbreak of pneumonia is largely a matter of sanitation and hygiene and less directly a matter of inoculation from one individual to another.

The men in the company previously mentioned had been rapidly mobilized: they came from the South and were not accustomed to inclement weather: they were rather crowded and the ventilation at night was not good, because they closed the top of the tents and kept themselves as warm as possible: they had to eat cold food, and after a few days every man had developed a cold: men were coughing and spitting in all the tents. In this way a vicious circle was established: as more of them became carriers, more became susceptible.

In consequence, I believe that to prevent pneumonia of the lobar type, one must not only prevent contact but remember that the most important thing is to avoid reduction of that resistance which naturally is very high in all human beings, and that one is dealing with a matter which requires careful hygiene and sanitation.

The most important of all is the question of ventilation and air space. That, of course, is doubly important, both from the general resistance point of view and from that of increase in carriers.

A few other things to be considered are:

1. The Overwork Factor. There was a very distinct improvement in conditions when the drill was not exhaustive. The method of gradually introducing soldiers to army life is to be recommended and is giving good results; it is a most excellent system.

2. Morning Sick Call. One of the measures adopted in this experience was to try to improve morning sick call. This is very apt to become a routine measure. It is at the morning sick call that the minor infections can best be picked out. In this particular epidemic

the speaker and his colleagues obtained the services of a senior medical officer to help the younger officers make their diagnosis. There were a great many cases in which careful examination of the men, who were coughing or showed other signs, prevented the spread of disease. It is therefore, one of the most desirable improvements that can be made.

One cannot, of course, expect too much of a battalion medical officer at the front, not because he is not capable but because of conditions; and the speaker believed in all these sanitary measures one should take the point of view of reinforcement and not that of criticism.

I consider that when we are dealing with the streptococcus pneumonia the problem is entirely different. It is the same sort of problem as in measles: susceptibility is probably universal. The normal resistance of a human adult is much less complete against streptococcus infections than against pneumococcus infections, and while the former are not the same thing as measles, we should regard them as a question of pure contact problems.

Relationship of Measles with Pneumonia. — In an epidemic of 701 cases of pneumonia, there were 389 that did not have measles and 312 that presented measles. Of the cases without measles 93 died. The death-rate of primary pneumonia was 12 o/o, and the death-rate of cases following measles was 29.8 o/o. The importance of this is self-evident and it has to do in the first place with the prevention of complications of measles.

As far as measles is concerned there is only one point to bring out, and that is *inspection*. When measles breaks out in a unit the only thing that can help to limit it is frequent inspection; the men should be inspected twice daily if possible. This can be simplified by lining them up and looking at their faces, feeling their pulses, looking at their tongues, and asking them how they are feeling. All cases of cough, conjunctivitis, undue tiredness, etc., should be isolated and observed.

Meningitis. — Meningitis falls distinctly in the same category as pneumonia; it is a question of susceptibility. Meningitis is not a disease to which men are universally susceptible; it is not like measles or scarlet fever. It is a disease that one man gets and another does not get under equal conditions, for reasons which we do not understand. The reason for susceptibility is a mystery at the present time.

When meningitis occurs in a command, a number of different methods have been adopted. In the U. S., last year, an attempt was made to make a carrier determination on everyone. In one

case an entire division was cultured twice. The speaker did not believe this could be done correctly : to culture 20,000 men twice over in the necessary time is physically impossible. His opinion was that that method is not a good one. There is only one thing in its favor : by making cultures, rough as the methods are, one occasionally picks up the proper carrier and gets the most dangerous men out at once.

Another method is that of making a careful epidemiological study of the men who have been in contact with meningitis, and making a careful bacteriological study of their noses and throats. If one makes careful studies on a limited number of cases this method may be of some value.

In troops that are active, when one cannot determine with whom a particular man was associated, the speaker recommended searching for the carrier rate and, if it goes beyond a certain proportion, treating all as carriers.

I am not sure, however, that the carrier has very much to do with the prevalence of meningitis.

At any rate, I think the two best methods are rate determination and careful bacteriological study of the men who have come in contact with an affected individual.

Diphtheria. — In the American army the handling of diphtheria has not been as easy as Colonel Beveridge found it in the British army. This is due to transportation on ships, principally. There is a principle which I should like to speak of as redistribution.

Two or three months ago we had a little epidemic of scarlet fever. A depot battalion had been formed of men from every unit of a certain division; only one of these units had had a case which developed into typical scarlet fever when taken to a French hospital. One man with scarlet fever was sent to the battalion depot, and after 6 days an epidemic began to appear. There were 11 cases in 4 or 5 days, but the disease did not spread in the original unit from where the sick man came.

In the American Forces there has been a great deal of trouble through the system of replacements. When men are continually streaming in, new units are constantly formed and we find that it is best not to disturb healthy units more than is absolutely necessary by forming new units out of old.

In the matter of controlling diphtheria we have been doing cultures on regiments. Diphtheria is easy to handle when you get in a compact unit which is by itself. It can then be stopped absolutely by isolating the entire unit and preventing its mingling with other soldiers and with civilians. The men can then be kept under ob-

servation, cultures taken, and the disease controlled in a short time. But this can only be done with limited and stationary units.

Important problems are those of divisions who come over here and where the same vicious circle is established as in pneumonia. Some division begins to get diphtheria and sometimes not a single unit is free from it. It is sometimes 3 or 4 months before you can feel that you have mastered the situation.

The only thing to do is to make careful epidemiological studies of each case and to take all possible sanitary precautions, plus one thing of paramount importance, and that is proper method of washing mess kits.

The usual method is to have a tub of warm, soapy water, and as the men get through with their meals they scrape and wash their mess kits in the tub. The result is that the 150th man gets all the saliva of the others, so if any carriers have left diphtheria bacilli, or any other bacilli, some of the men are sure to get the disease. We have therefore been trying to keep the water boiling, or, if that is not possible, we have given two tubs of water (or more) with a disinfectant solution.

Streptococcus pneumonia and bronchitis were extremely serious in the U. S. last winter. They are arriving here and we shall have more of them next winter. From general experience I think the great thing is to improve sanitation; as sanitation improves, bacteriology becomes less necessary. The ideal would be to eliminate it altogether in favour perfect sanitation.

Discussion.

Colonel P. B. Soltau, R. A. M. C., said that the high rate of respiratory infections in the American army had been pointed out. As divisions go more and more in line they may be exposed to gas. The British experience has been that when men were suffering from broncho-catarrh the death-rate from gas infection tended to increase.

If the high rate of respiratory infections in American troops is maintained, it might cause a greater number of deaths from mustard gas in troops exposed to that agent. This acts as a chemical irritant and sets up a burn which is followed by bacteriological infection, especially in the pleura. The bronchi will get burned from the vapor and broncho-pneumonia, which will kill a great number of men, is a likely consequence.

There should, therefore, be a special effort to improve the health of the men by avoiding crowding.

Colonel Cummins, R. A. M. C., said that he desired to lay particular

stress on one disease that had been mentioned, and that was tuberculosis. He did not wish to lay stress on it so much in reference to white troops as to black troops.

America has a complete army of black troops, and one could not help being struck with a point of this kind. Professor Borel had brought out clearly the fact that the blacks come to this country with no real protection against pneumococcus infections and that they have no resistance. Major Zinsser said how, under hygienic conditions, resistance could be increased and how it could be lost through defective sanitation. These remarks, made in reference to pneumonia, should be applied to tuberculosis.

It has been quite clearly shown that tuberculosis is a very fateful disease to the blacks as a race, when they are living under native conditions. The speaker thought the important point to be this: It is clearly the duty of our officers to improve sanitation for the colored troops and to protect them from tuberculosis while they are fighting or working in the war, so that they may not go home and spread this disease among their own people.

Overcrowding is the principal factor in this disease and it should be decreased. We should serve the black race and should exercise our right to preserve them from a disease that we know how to fight.

Médecin-Major Borel said that he wished to supplement what the previous speaker had said on the subject of tuberculosis. He wanted first to present statistics on the vaccination of a battalion against pneumonia. The battalion comprised 7000 men of from two to three years enlistment. Tuberculosis broke out in it. At this time some fresh battalions arrived from the colonies. In general, only one or two soldiers of the new troops were affected by tuberculosis.

The speaker used tuberculin on the soldiers of one of the fresh battalions. No reaction was obtained. On the contrary, in the case of the troops which were returning from the front and which had passed from two to three years in France, the following results were observed: in 10 cases there were three positive reactions; one of the men had just spent two months in the hospital; another had been gassed; and a third had been severely wounded.

Tuberculosis among the colored troops does not come from the colony, and is very rarely found among new arrivals; and if it is found, by chance, the sufferer is from a town where French is spoken.

The speaker said that he now passes all the new arrivals in review

with the bodies exposed to the waist. The inspection is rapid but sufficient. The characteristics of tuberculosis among the colored troops are easily distinguished. The skin of a colored man with symptoms of tuberculosis is dry and withered instead of being shiny. If, furthermore, there are any cervical ganglions the individual is withdrawn from the ranks and hospitalized for an observation period of 15 days, and is then sent back to the colony.

The principle followed is to inspect the battalions every month, and to isolate and watch any suspected cases.

There is a special service for hunting out tuberculosis at St. Raphael. Out of the battalion of 7000 men there were 47 cases of tuberculosis or of pneumonia in three months. In other battalions there was not a single case.

Colonel Thayer said that Professor Borel had noted that of the Africans who arrive in France a very small proportion had tuberculosis. There is evidence that some of them acquire it here. Professor Borel has adopted the method of carefully examining the men when they arrive and of inspecting them every month, setting aside all suspected cases.

Before sending American troops over here a careful study was made in America and about 1 o/o of the men were found to show signs of tuberculosis and were kept at home. Since we have been here we have had but few cases. Major Webb has pointed out that the disease is beginning to appear among our troops in France. It is only by carefully examining the men that it can be kept down.

Colonel Beveridge, in closing, said that a certain proportion of our colored troops (Kaffirs and Chinese) come to this country susceptible to tuberculosis. Under conditions of climate and exposure, the disease develops. In the French army it has been noticed that certain men get tuberculosis after exposure to gas.

Mumps and measles follow the seasons. Last year we had less cases than in 1916, and this year less again. One generally has one attack of mumps and measles during life; therefore, most men are immune because they have had these diseases in childhood. The cases we have had were chiefly in men coming from country districts, town men having had these infections in childhood. It has also been noted that men from the mountain districts of Scotland get mumps or measles when they mingle with other men.

Outbreaks of scarlet fever in our army have been small. Diphtheria has been increasing in the British forces during the last two years and we get a good deal of it in hospitals. The speaker had been told that it occurred chiefly among the nurses and orderlies,

and was presumably due to infection brought by the wounded.

Diphtheria frequently break out among children, and men get it in this way. Good results have been obtained by isolating the cases.

A certain amount of infection is carried by the sharing of blankets. It would be ideal if a man could always retain his blanket, for there is always great danger if one man passes on his blanket to another.

Major Haven Emerson, M. R. S, said that reports from the Chief Surgeon show an increase of streptococcus infection in the American forces. There have recently been cases of streptococcus pneumonia, with 15 deaths, occurring from much overcrowding. It is interesting to know that the same conclusions as arrived at during the meeting had been arrived at by division surgeons in various parts. They have used various devices to diminish the over-crowding and efforts have been made to get the men out of crowded billets and into tents. In sanitary reports it has been mentioned that prevention of pneumonia is in proportion to the ingenuity of the sanitary inspectors in obtaining more space than that allotted.

In hospitals principally the Schick test should be made : this has saved certain organizations from infection. Recently there have been 10 cases of diphtheria among the attendants in one hospital.

In regard to the question of the country man and the city man, there is some evidence of a good deal of duplicate infection. Some men, who believed they had had measles in childhood and who were exposed to heavy infection, have had secondary attacks.

It is worth noting that prompt action resulting from rapid reporting of cases ensures very little effect locally, and it is necessary to get rapidly into contact with the French medical officer for the civilian population.

General Burtchaell said that one point of importance was the relative amount of cubic space and floor space. Under war conditions it is quite impossible in the majority of circumstances to give the amount of floor space and cubic space laid down in text books; but we must bear in mind that the essential point is to ensure adequate ventilation. Space in itself is not nearly so important as free ventilation.

In the case of dug-outs, ventilation is fairly good, but space is limited and the men get on very well without developing any great amount of infectious diseases.

One cannot help feeling that the part played by blankets in conveying infection is relatively small in the British army because

of the few cases of infectious diseases which have developed.

The proximity of men in billets and in dug-outs with a small cubic space is a serious matter, but the diseases communicated or developed from over-crowdings generally occur among men living day after day in limited spaces. Soldiers are, as a rule, in a confined space for one night only, and the medical officer is often too insistent that troops cannot occupy shelter because they would be over-crowded. He should consider that when they are to occupy this limited space for one or two nights only it is better to take a limited risk and give them shelter than to expose them to the elements outside.

FIELD SANITATION

Methods of Feces Disposal and Fly Prevention in the French Army. By Medecin-Major Octave Monod.

The speaker said in part :

Of the problems which the sanitary authorities in an army have to solve, two are particularly important : the destruction of fecal matter, and the fight against the fly.

The speaker said that he would treat the subject simply from the practical point of view. His remarks, he said, were based largely upon circulars published since the beginning of the war by the Service de Santé and the General Headquarters.

The Destruction of Fecal Matter. This may be accomplished either by incineration or by burial. The former procedure is the usual one in the English Army; the second, on the contrary, is almost exclusively employed in the French Army.

Burning has the advantage of destroying rapidly and completely all organisms of a dangerous character present in the fecal matter.

The simple procedure of burial should be accompanied with certain precautions (set forth below).

When the troops are at rest, whether in special camps or in inhabited villages, it is indispensable to have available a considerable number of pits carefully distributed so as to prevent the necessity for men to defecate at large.

In the villages and in places where pits may not be dug for fear of contaminating the veins of water underlying the surface of the soil, recourse must be had to metal receptacles. A ditch for the disposal of the contents of the receptacles may then be dug at a point where contamination of the water supply need not be feared.

Every day this pit should be sprinkled with disinfectants, such

as crude oil, cresol, and quick lime, and covered over with earth.

The Fight against the Fly. It is very evident that all precautions taken against fecal matter concern the fly problem as well. The fly is as dangerous as it is disagreeable and filthy. It is frequently a means of propagating disease. It may be suppressed in two ways: first, by preventing the hatching of the fly's eggs; and second, by the destruction of the fly itself after it is hatched.

Although there are many varieties of flies in France, the methods of combating them are not as numerous.

The house-fly lays its eggs on all kinds of organic matter in process of decomposition. Fresh horse manure appears to be the most likely place of deposit. About 90 per cent of fly infestation may be traced to this source.

The eggs are layed on the surface of the manure, where the newly hatched remain until about the sixth day, when they migrate to the lower strata before complete development. The young flies are so delicate that they require the protection of a house, and if houses are sufficiently removed from the place of propagation they are not likely to become infested.

In order to prevent the hatching of the flies, the manure must be removed daily from the neighborhood of the troops. The manure should be burned whenever possible. In each district there should be an incinerating furnace. If, however, incineration is not possible, the dejecta must be buried in a deep and narrow ditch, which should be sprinkled daily with a 50 per cent solution of crude oil. When the ditch is three fourths filled, it should be completely covered with earth.

Slaughter-House Disinfection. The slaughter-house center ought to be infected likewise. The cattle pens should be sprinkled with iron sulphate (10 o/o).

The debris from the animals should be burned, or at least buried after being thoroughly sprinkled with iron sulphate powder and covered with tar to keep away the rats.

Dead Bodies. The removal of dead bodies from the field of battle is often a difficult and dangerous operation on account of exposure to bombardment and attack. The burial of bodies near the first lines is rarely attempted, as it is better to remove them to a less exposed region before attempting to inter them. This enables the workers to dig the pits more carefully and to carry out the proper sanitary measures.

Small camionette automobiles facilitate the search for and removal of the dead bodies. When they have been withdrawn to the rear, the bodies are placed in a pit of about one and a half meters in

depth. They are then covered with a layer of quick lime or they are covered with a preparation of crude oil and cresol. When bodies are too badly mutilated or decomposed to permit of removal, they must, of course, be buried with whatever care is possible.

The bodies of animals, which of course cannot be removed, must also be buried without removal and as soon as possible.

Dead bodies near the trenches, which cannot be removed, must be covered with quick lime or sprinkled with the solution of crude oil and cresol. They may be effectively isolated by the construction of a wooden shield filled with lime and earth, or by a sufficient quantity of crude oil and coal tar.

Protection against Winged Insects. When all the precautions already mentioned are taken, the hatching of flies may be greatly reduced. These measures, however, meet with many obstacles which prevent a complete realization. Flies are especially dangerous by reason of their going and coming between the decaying organic matter and the food depots or cooking establishments. Every precaution is therefore necessary to protect the preparation and storing of food against this grave danger of infection.

The store houses in which fresh food is kept must be screened by a wire netting. The bread supplies and all others must be guarded in this fashion, and as the wire or gauze netting necessary for the purpose is easily transported, this precaution may be easily taken anywhere and at any time.

The speaker described a cabinet contrived by him to afford such protection. The walls were of cloth or gauze, kept out by the weight of the tray forming the base as the whole hangs from a hook in the ceiling.

As flies avoid dark places, it is well to avoid as far as possible the lighting of store houses by windows or other openings.

In spite of all precautions, flies succeed in penetrating the barriers. It is therefore necessary to consider the means of ridding the stores of flies. The means most frequently employed are as follows :

1. A solution of formol is placed in a plate (2 parts formol to 100 of water).

2. The following mixture may be used instead :

5 parts of formol.
25 parts of milk or butter milk.
60 parts of slightly sweetened water.

A few pieces of bread are floated in the solutions to attract the

flies. The plates should not be placed in a draught, and their number should vary according to the size of the room.

3. A sticky tanglefoot may be prepared by melting :

72 parts of gum in 50 parts of castor oil.
12 parts of honey or of glucose are added.

Slender rods are dipped in this preparation and stuck up in receptacles filled with sand.

6. Another tanglefoot preparation is :

15 parts castor oil.
8 parts of resin.

The mixture is obtained by boiling. This preparation is used in the British Army.

When it is desirable to kill at once all the flies in a given place, sulphur or cresol fumes may be used.

1. Sulphur fumes may be produced by combustion of stick sulphur, allowing 30 grams for each cubic meter to be disinfected.

2. The amount of cresol to be vaporized is about 5 grams per cubic meter of the air space to be disinfected. This quantity of cresol is heated in a metal receptacle, so as to avoid the danger of conflagration. The fumes thus given off are very toxic for insects, but wholly inocuous for men. The vapor should be left in the chamber from four to five hours. It is often convenient to allow fumes to remain during the night.

The speaker briefly alluded to the admirable sanitary organization effected by Monsieur Godart, who made provision for a permanent body of hygienic officers in each Army Zone. A maximum of comfort and sanitary environment has in general been provided, so far as the conditions of war permit.

Disposal of Feces and Fly Prevention in the British Army. By Major F. P. Joscelyne, A. D. M. S., Sanitation Army Corps.

The speaker said in part :

The disposal of feces has proved to be one of the most difficult problems of sanitation in the war. Different methods have to be taken in forward and back areas. Soil and water level play an important part. Rain, wind, and sunshine increase our difficulties. The fly is at once our deadliest enemy and our best friend in that he immediately informs us of the presence of uncovered feces.

There can be little doubt that dysentery is largely a disease of flies bred on human feces. I will not waste your time to discuss

other fly-borne diseases. I will place before you the means we have adopted to dispose of the feces upon which the fly lives and breeds. The B. A. allows 4 o/o of seats.

In the forward area — and by the forward area I include trenches, outposts, and any area within 5000 yards of the enemy line — it is clearly impossible to dispose of feces by incineration. We have left to us only two methods :

1. Sending the feces back to be burned, which has been tried, and has failed.

2. Burying the feces.

The first method of burying feces was by digging a shallow hole in the ground, putting a pole across it, and then throwing a light covering of earth over the deposit. This soon fell out of favor chiefly for the following reasons :

(*a*) The pits were not deep enough to care for more than one, two or three days.

(*b*) Men neglected to cover the feces.

(*c*) Paper flew about all over the place.

(*d*) The latrines were swarming with flies.

(*e*) Even when covered after use, fly maggots were frequently observed burrowing through the earth.

Then uncovered buckets, latrine pails, biscuit tins and oil drums came into use, still with the same pole seat. These were simply emptied into deeper pits and shell holes, were unwashed and subject to the same disadvantages as before.

In 1915 rudimentary seats were, wherever possible, placed over these tins and buckets and matters began to improve. After the advance in the battle of Loos, September 25, 1915, we found the first — as far as I am aware — deep pit latrine. It is probably in existence to this day. The pit was enormous. Speaking from memory I should say that it was 20 feet long, 7 feet wide, and 30 feet deep. It was fitted with an enormous seat, with four or five holes in it, and had no lids to the seats. I say that this was the beginning of deep pit latrines used in trenches, with some reservation. It was the first that I ever saw and I was not long in copying the design. The regiment with which I served built 4 latrines in the front line, 10 feet deep, 2 feet wide, and 6 yards long. We boxed them and lidded them, and they served for about 600 yards of line. They were voted a great success and were used for feces, tins, food refuse, and sometimes for shelter. The back of the box seat was left open for flies to enter and leave as they desired.

The methods now adopted have very considerably improved, and

much depends upon the energy and efficiency of the medical officer and upon the amount of discipline driven into troops by the commanding officer. In one line you will find oil drums with close fitting lids. In another line you will find buckets with close fitting lids or boxes, but the method of disposal in both is the same. A careful medical officer will see that his sanitary men keep a liberal supply of cresol in the buckets, and that the feces are buried every night in a shell hole 20 yards behind the trench, and well covered with earth. Too often, owing to carelessness and scanty training of the sanitary staff, cresol is neglected and the feces are ill covered and dumped near the trench. And here our friend, the fly, finds it out, and immediately warns us of its presence.

In another line, where geological conditions are suitable, deep pits are dug and boxed in with fly-proof covers, and, if well looked after, save the sanitary men much trouble and danger. I mention danger because in 1915 I had two of my sanitary men killed while emptying buckets, an operation which necessitated leaving the trench.

In both these systems, now commonly in vogue, I very strongly deprecate the custom of throwing chloride of lime about. My experience is that, when chloride of lime is freely used by a regiment, there is something very wrong with the sanitation of that unit.

Cresol, on the other hand, if properly used in a feces receptacle, is of itself almost sufficient to keep flies away from a latrine. Commanding officers must be made to realize that they are responsible for every branch of sanitation, and that their medical officers are their advisors; at the same time medical officers must be repeatedly reminded to pay more attention to training the men who have to do the manual work. Here, as everywhere, good discipline means good sanitation.

In back areas, where incinerators can be used, the disposal of feces should present fewer difficulties. The ideal method is incineration. It is not always possible, owing to the lack of fuel: and if a plentiful supply of sawdust or wood — coal is out of the question — can not be regularly supplied, then I am all against it. I will tell you what happens : a bucket system is installed at great trouble and expense, and as long as fuel is obtainable everything goes well. Then perhaps the saw mill is moved, and the supply of sawdust is cut off. You struggle on trying to burn, and find yourself landed with an impossible problem to solve. Therefore, I say in forward back areas, if possible, make pit latrines with

fly-proof covers, which are adaptable either to pits or buckets, and be ready to use either system at a moment's notice. A well-made pit latrine should be 7 feet deep, and should have a urinal entering into it. It should be covered with well trodden down earth when full to within 3 feet from the surface of the ground. I have found maggots working their way through 2 feet of earth, and this maggot is more dangerous than any other bred fly, since we know that his whole being is a living mass of human feces.

In towns and large villages occupied by troops, there can be no question that incineration is the only permissible method of disposal. Last summer in Poperinghe we were burning 1700 full buckets of mixed feces and sawdust every day. The dump was on the outskirt of the town, with a staff of 14 men. The whole of the refuse of the town, civilian and British, was brought to the dump. The feces was brought in closed iron tanks and dumped into a cement pit; the floor sloped slightly and allowed the urine to drain into large overflow pits, which were emptied twice a week by means of a *vidange* pump, and the liquid put onto the neighboring hop fields. Sawdust was then added to the solid feces, and well mixed by an attendant, who kept his gum boots in a cresol mixture. It was then put in buckets and burned in Horsfalls', and Horsfall type, brick incinerators. Five incinerators were in use, three of them night and day.

In Ypres, during the last winter, I adopted another plan which was equally efficient. Here plenty of wood was available, but sawdust was difficult to get. I built a series of small incinerators, 4 feet by 2 feet, which would just comfortably take a couple of logs on the fire bars. Over the logs was an iron plate, upon which the feces rested and was gradually dried. As much sawdust as was obtainable was mixed with the feces, and the dried mass was used the next morning to light the fire. The whole secret of the plate drying method is to keep your incinerator small. One man can look after 3 of such incinerators; the feces must be added in small quantities, and one incinerator will consume 4 1/2 buckets full of feces in 6 hours.

If you are going to incinerate feces, you must train your men well and not change them about. An untrained man cannot do the work efficiently. For small, out-of-the-way units, I advocate deep pit latrines. For Chinese labor groups and colored troops, and all medical units, I insist on incineration, and use a corrugated iron incinerator, with a drying plate. Inefficient incineration is the worst possible means of dealing with feces. The use of cresol in buckets aids incineration. Every bucket waiting for inciner-

ation must be kept covered, and a concrete slab must be built upon which to mix the feces and sawdust. Some of the liquid must be drained off into a urine pit, which should filter from the mixing slab.

Scrupulous cleanliness is necessary in all these operations. And lastly, a dip bowl with soap and towel must be kept handy for the attendant to wash his hands before meals.

Feces burning is not a pleasant occupation and its efficiency would increase if a higher rate of pay were granted for it.

Fly Prevention.

In the absence of human manure, the fly prefers horse manure to any other substance in which to make his breeding ground. If a manure dump once gets out of hand, it is almost impossible to ever straighten it up again. One finds the utmost difficulty in getting troops to arrange manure in any kind of order.

There are two good methods of stacking manure :

(1) In lines of any length the manure is stacked 10 feet broad, 7 feet high. A trench is dug on either side of it, and the manure is covered with the earth from the trenches to an even depth of perhaps 3 inches of soil. It is just the method that every one knows, who is country bred, of making a vegetable marrow bed. Such a heat arises within that bed that no living thing can ever come out of it. By this method the manure retains its value for some time, and will be of great value to the farms after the war, where cattle are depleted.

(2) The second method of stacking is to fill up old trenches, tread down tight, and cover with earth. By this means an even greater heat is attained, but the disadvantages are :

(*a*) That trenches are not always ready to hand.

(*b*) That much of the manure will be lost to sight.

The next method of disposal is to get farmers to cast it away. It is not very satisfactory because farmers in France and Belgium prefer a rotted manure, and will always leave it, if they can, for weeks on end. Again, they cannot use it on growing crops at the time of year we want most to be rid of it.

Incineration of manure, as far as I have tried it, is a failure, excepting during the sunny weather. A grid is put across a 2 foot trench and the manure laid lightly over it. A fire is started with straw, and the manure will smoulder for days.

Paraffin has been largely used to destroy old dumps. It is extravagant, unsatisfactory, and dangerous. A manure dump is gener-

ally near horse standings, and a night bomber has a good chance of knocking out many horses if he sees a glowing fire.

Two years ago we were able to get a valuable preparation for spraying farm manures and manure heaps that were impossible to remove. It was called C solution. This solution is not now available, excepting in small quantities.

Manure must be placed as far as possible from dwellings, and clear direction boards must be arranged at every conceivable corner to direct people to the dumps. Every village has its dump and its management is under the direction of the area commandant or town major. Sanitary sections have special instructions to visit these dumps regularly, and a separate heading to report on them in their monthly reports.

These measures have led to a vast improvement during the four years of war, and there are less flies this year than we have seen before.

If manure cannot for any reason be stacked and covered (e. g., in the small farmstead), it is a good plan to cover these fly-breeding haunts with a thin layer of clean white straw. What the action of it is I do not know, but the effect on the diminution of flies is remarkable, and is worth an experiment to those interested. Even one day's trial outside your own billet will convince the most sceptical disbeliever.

Assuming that the fly has now bred in spite of our endeavors to stop him, our next endeavor is to prevent him settling on our food. Wherever possible the windows of messes should have thin muslin, or gauze, or wire gauze tacked over them.

The kitchens should be always — I refer to officers' messes especially — outside the house, and never allowed inside. Officers' kitchens are always the dirtiest seen, and nobody takes the smallest interest in them.

Now comes the great question of food and how to keep it from flies. What happens to our food before we receive it I do not know, but I will give you a brief history of it from the time it is dumped at a forward railway station up to the moment that it is eaten in the front line. Its first resting place after it leaves the truck is mother earth. She may be covered with sail cloth, or not, as the case may be; or possibly the food may be dumped on trench boards. Too frequently, even now, one sees it dumped by the side of a main thoroughfare on the pavement or path. If no cloth or boards are used, the sacking becomes wet, and the glutens or juices ooze into the sacking, the sun comes out, and immediately the flies settle in swarms upon the damp coverings. If it is dusty,

every motor lorry showers it with road dust, and again the fly is attracted by the mixture of food and horse manure dust.

Prevention :

(1) Food dumps must have sail cloths or trench boards for the food to rest on.

(2) The food must not be put on the pavements of main roads.

(3) Food should be distributed early in the morning before the fly is awake.

(4) Sanitary officers must visit these dumps at frequent irregular intervals, and take disciplinary action against the officer at fault.

There is no other way that I can see to defeat the fly at this dangerous stage of the food's journey.

The food is now rationed in bulk, and the carts convey it to the Units. Here it receives altogether better treatment because no quartermaster attains his position without merit. I have always found regimental quartermasters most careful in their methods of dealing with food, and a fly in a ration store is rarely seen. This simply means that good discipline lessens the chances of the fly to pollute food.

Here the food is rationed into smaller quantities, and packed in clean sand bags and sacks and sent to the trenches and transport lines. This is done at night and flies have no chance.

In both trenches and transport lines, the food is subjected to great danger of pollution as both of these places generally abound in flies. Here, again, it is simply a matter of discipline whether or not the food becomes contaminated. Scrupulous cleanliness, as far as possible, must be insisted upon, as inadequate arrangements for the collection of refuse and tins lead almost certainly to dysentery and diarrhea among the troops.

Tanglefoot, wire fly traps, and Japanese wheels are useful in messes and kitchens, but they are of little value if the kitchen is dirty, if the grease traps are not attended to, if the butcher's block is not clean, if the refuse and decaying vegetables are not removed and incinerated, if there is not a covered receptacle for all refuse collected during the day, and if meat safes are not provided and used.

The commanding officer is responsible for all these things being done, and he should be made to realize the responsibilities of disease among the troops entrusted to his care.

Feces Disposal and Fly Prevention in a Division. Colonel J. W. GRESSINGER, M. C. The speaker said in part :

This subject has been so thoroughly discussed by those who

have preceded me on the program that I feel that there is very little left for me to say.

There are several points, however, which, though mentioned, I feel have not been sufficiently emphasized. It seems worth while to draw special attention to them. The latrine boxes, incinerators, buckets, grease traps, and other appliances so clearly and fully described by Major Joscelyn of the British Army, are all admirable and splendidly adapted to the purpose intended. I can add nothing to them. However, in the sector occupied by American troops, transportation is such a serious problem and there is such a shortage of lumber that these appliances cannot be used. We from the States know that the Havard box properly cared for and burned out daily answers the problem perfectly. But we can get no oil and not sufficient lumber so that we must make the best of circumstances and utilize some other means of feces disposal.

In sector warfare, we have found that a flat topped lid made by nailing boards over two cross pieces and just big enough to properly cover the latrine pit works very well. Every second or third board, depending upon their width, is not nailed down but is furnished with a handle accurately fitted into place, and makes the lid for the corresponding opening. There are several distinct advantages of this type of cover over the Havard box :

a) It requires only one fourth the lumber.

b) It has only one surface to be made fly proof instead of five.

c) There is no contact of the men with the seat thereby lessening the chance of spread of vermin and possibly also of venereal disease. The men must assume a squatting position but this is natural and not a disadvantage.

Latrine buckets can also be used with good results if properly cleaned and cared for. The straddle trench should have no place in trench warfare, as enough lumber can usually be secured to make the flat top cover mentioned above. Failing this, latrine buckets can be used. Incineration has been out of the question. Fuel is scarce and oil so far has been unobtainable in any quantity that would be of practical value. Also the smoke by day and light by night cause considerable danger from enemy shell fire.

So far, in the American advanced areas, we have been unable to use ideal methods but have been compelled to improvise and do the best possible with what we could procure.

The main point, however, that I want to emphasize strongly is that it is not a question of type. It is a question of personal supervision. It doesn't matter a particle what method is employed provided ordinary judgment is used in the selection of the particular

method. Anyone of the methods mentioned will be perfectly satisfactory if proper supervision is given it; any one of them will be an utter failure if not properly supervised. We have seen untrained, undisciplined troops, with untrained officers occupy a modern barrack with a modern toilet, tiled floor and flush closets, and have seen it in a week transformed into a filthy, nauseating mess. Newspapers being thrown into the flush bowls, clogging the pipes, the chain when pulled gave an overflow with easily imagined results, toilet-paper and newspaper all over the floor; in general as unsanitary a place as one could well imagine.

On the other hand, we have seen a company go into the field with nothing but shovels for sanitary appliances, and conduct a camp that was entirely sanitary; feces disposed of in straddle trenches, promptly covered, attracting no flies and giving rise to no offense.

We have seen on the Mexican border a well disciplined organization have latrines with fly tight boxes, protected by a screened shelter, that were a delight from a sanitary viewpoint. Burned out daily, kept immaculately clean and perfectly fly proof, there was no odor, no flies, and one could have stayed in the enclosure for an hour scarcely realizing that a latrine was in the vicinity.

Within two miles of the same spot, we have seen the same facilities: Havard box, screened shelter, oil and straw for burning; but in a week this latrine was unspeakably dirty, paper scattered everywhere, urine trough foul, box not fly-proof, and the contents of the latrine pit alive with maggots, with flies thick in the enclosure.

Here were identically the same facilities with exactly opposite results.

I repeat, as strongly as I am able to express it, that it does not matter a particle what system one adopts. Proper supervision is the whole solution.

To secure results there must be —

A. Education.

We, as medical officers, understand the dangers of disease transmission by flies, but it is astonishing how many line officers do not realize its importance. The enlisted men as a mass do not have the proper realization of the problem and there are also some medical officers who need instruction in the matter.

Education is then a most important function so that officers and men may have a proper realization of the dangers connected with this pest.

B. Organization — Discipline.

Without organization and discipline, we get nowhere. With them, we can accomplish anything. Some organizations have officers at their head who are alive to this subject, interested in the welfare of their men and always anxious to obtain good advice. With these there will be no trouble, but their number is far too small. The majority require constant supervision in order to prevent serious outbreaks of preventable diseases.

C. Unceasing Vigilance.

This requires constant inspections no matter how irksome they may become. Make the inspections at unexpected times.

Place the responsibility for each particular thing on some particular individual and under no circumstances accept excuses. If you do, there will always be a plausible one presented.

Be liberal with praise where good work is being done. We are all human and it is astonishing how hard men will work if they feel that their efforts are really appreciated. They soon come to take such a pride in the organization that it well repays all effort expended. On the other hand, follow each sanitary offense with appropriate punishment as inexorably as night follows day.

There are too many organizations where, when the sanitary inspector reports a dirty latrine to the organization commander, the latter calls the lieutenant and transmits the report telling him to have it corrected. The lieutenant calls a sergeant and passes on the instructions, the sergeant repeats the same to a corporal, the corporals picks out the nearest private and tells him to get a broom and clean the place. The private has nobody to fall back on, so he does the work. Perhaps the captain inspects the latrine next day and finds it clean. He throws out his chest, thinks he has discipline and promptly forgets the matter. At the next visit of the sanitary inspector, conditions are just as bad as before and when he reports to the company commander the latter cannot understand how that can be possible. The point is, there must be *unceasing vigilance*, constant inspections and untiring personal supervision of the company commander and the surgeon. With this results will be perfect no matter what method is used. With anything less, any method will be a failure. This cannot be too strongly emphazised.

The disposal of garbage presents essentially the same features. It may be disposed of by incineration, burying, or by giving or selling to farmers. It is not necessary to go into details as to these methods, as they have been fully covered and I can presentn othing new. Each method is satisfactory if properly supervised. Each is insanitary if neglected.

Open Warfare:

In the recent second battle of the Marne, the writer, who had the honor of serving throughout that struggle, was impressed with several very striking sanitary problems.

1. The Germans in their retreat left things in foul condition. In barns and similar buildings, they had defecated promiscuously in rooms on the floor. I have been told by medical officers that they did the same in rooms of chateaux and that they even defecated in drawers. They also used the surface of the ground and left open latrine pits with no attempt to cover the contents. The result was that flies had bred in great numbers from causes over which we had no control.

2. Our own men, after undergoing the tremendous mental and physical strain of 4 to 6 days fighting, let down very markedly in sanitary matters. As they were brought back in reserve and camped in shelter tents in the woods, these men were utterly exhausted mentally and physically. All they wanted was rest, food and drink, and the simplest sanitary precautions were forgotten. Men defecated on the surface of the ground or, if pits were dug, the contents were not covered. The result was more flies.

There was of course marked disorganization in some outfits through loss of officers. One battalion, for instance, lost every officer: naturally that battalion deteriorated rapidly in a sanitary way from lack of supervision. There was also a too prevalent attitude among medical officers that "Well, we will be here for only a day or so" and no precautions were taken. They were kept longer than at first anticipated and soon had a most unsanitary camp.

Medical officers should be impressed with the fact that, no matter how temporary they think a camp will be, they must take every precaution to prevent fly breeding or any other unsanitary development. Always go on the supposition that your camp is going to be more or less permanent and no sanitary faults from this cause can then arise.

3. The most striking thing, however, was the number of dead bodies of men and animals and the length of time they remained on the field. They were scattered everywhere, and as they lay for days unburied the stench was terrific. It is believed many of these bodies were unburied for at least 10 days. Worse than the odor, however, was the fly breeding that took place in these bodies. They soon became black, swollen, decomposing masses of organic matter, simply alive with maggots. They were the principal

cause of a plague of flies that it was necessary to see in order to properly appreciate.

There was direct and easy access from these bodies and open latrine pits to the food of officers and men, and the flies were not slow in taking full advantage of the fact. The result was just what would be expected — a widespread outbreak of diarrhea which affected nearly everybody. Fortunately, cases were mild in character and there was no mortality. Men were not sick usually more than 2 or 3 days but there was considerable tendency to recurrence.

Investigation by bacteriologists showed the presence of Shiga and Flexner bacilli, paratyphoid and certain aberrant types.

We were fortunate in getting away with a mild infection with no mortality, but there is no assurance that under similar circumstances in the future a true virulent Shiga type dysentery might not be implanted upon this highly favorable soil and a serious epidemic supervene with high mortality and tremendous ineffectiveness.

Were it not for typhoid and paratyphoid inoculation, under conditions such as existed during this recent campaign, there is no question but that these diseases would be rampant. But this inoculation presents no barrier to dysentery and vigorous steps must be taken to prevent such outbreaks in any future operations. It will take vigorous systematic methods to prevent disaster in the extensive open operations that we are apt to have next year during the warm season. The greatest menace lies in the delay in burial of dead men and animals. A systematic method must be instituted at once to overcome this.

As a solution, the writer proposes that each corps be furnished with a labor battalion — to begin with, say 5000 men. These men properly officered will follow up divisions as closely as possible and bury dead men and animals. They will work in conjunction with the Graves Registration Service in order to assure proper identification. In this way, the battle field can be kept clean, bodies buried promptly and fly breeding from this source entirely eliminated. .

They should be corps troops, the division being left free for fighting purposes. The Pioneer Infantry of a corps could well be utilized for this purpose.

Sanitary inspectors, corps and division, will do well to carefully supervise this work which will be a most important function. Combatant troops should not for several reasons be called upon to bury their dead.

a) Combatant troops cannot be taken from the line during combat for this purpose. Prompt burial of the dead is absolutely essential.

b) Combatant troops cannot be called upon after combat as they are mentally and physically exhausted,

c) The effect of this kind of work on the morale of troops is the worst imaginable. Nothing worse can be imagined than to have combatant troops returning from a battle compelled to bury their comrades, especially if days have elapsed during warm weather and the bodies are in the condition noted above. Each man so engaged will have a mental picture of himself in exactly the same condition every subsequent time that he goes into action.

On the other hand, if troops coming back from combat see no evidence of the recent engagement, they will subconsciously conclude that it wasn't so bad after all. All wounded removed promptly and all dead decently and promptly buried will have a wonderful effect in maintaining the morale of troops. The men who are risking their lives in this tremendous conflict are entitled to nothing less.

Feces Dispoal and Fly Prevention in a Base Section. Lieutenant-Colonel H. C. Coburn, M. C.

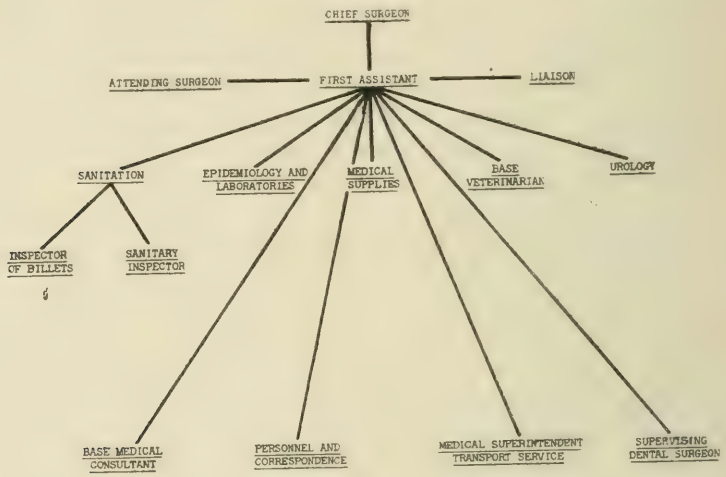
The speaker said in part :

The various methods of feces disposal and fly prevention in use throughout France have been so thoroughly discussed by the previous speakers that I will not take the time of the Society with any further description of the types of latrines and other devices used in the elimination of excreta and combatting the fly problem, but will confine myself to a short summary of the administrative side of the question from the point of view of a Base Surgeon's office.

A discussion of feces disposal and fly prevention in a base section may be considered to involve practically any part of France except the front. In fact the base with which I am most familiar covers about one sixth of all France, with a terrain varying from many miles of sea coast with adjacent low lying sandy soil and ground water within two or three feet of the surface, through pine covered plains, back to hilly and finally mountainous districts with some of the highest peaks found in this part of Europe. It is thus evident that no one scheme of disposal can be applied to all parts of such an area. Excreta, for example, may in some districts be conveyed to water courses by means of modern sewerage systems: in other sections the pit or tinette type of latrine may be used ; the

method depends upon location and the availability of supplies.

The activities of a base section may be many and varied. Along the estuaries on coast are docks for the reception of troops and freight, adjoining which we find colonies of stevedores, labor troops, civilian construction companies, Algerians and Annamites, all living in close proximity in necessarily contracted camp sites. These are usually surrounded by civilians, crowded as near as possible to the camps, either by accident or for purposes of trade. Of course the sanitation of these camps is a matter of grave concern and constant vigilance. Rest camps for the temporary housing of incoming troops, organization and training centers where their education is perfected, and large training camps for



the same purpose, holding as high as three brigades each with seven to eight thousand horses, are found near the ports. Stretching back from the sea through sandy plains covered with pine woods are numerous forestry camps. These have been noted among the natives for the large number of flies found there every summer, possibly due to the heat retaining properties of the sand facilitating the hatching of larvae, granted the presence of the necessary organic matter. Besides the camps, troops are billeted throughout the bases in villages with the ever present manure pile, the home-made latrine and their mutual friend the ubiquitous fly. Base and camp hospitals and infirmaries, prison camps, remount depots and veterinary hospitals are among the various activities, each of which has its own individual problems and methods of solution.

Organization : The supervision of sanitation in such extensive areas, with their divergent enterprises, necessitates a well considered plan of co-operation, by means of which the care of individual units may be correlated and maintained under the direction of a central head. This resolves itself into the question of local and central administrative control.

Local control : The commanding officer of each camp or individual formation is responsible for the sanitary condition of the organizations under his command. Through the line officer detailed as "police officer" the necessary sanitary details for clean up work are handled. Daily inspections of the various camp areas are made by the regimental surgeon who reports to the regimental commander any irregularities found. Each permanent camp has a Camp Surgeon, a senior medical officer, who remains on duty there irrespective of the shifting of the organizations temporarily in camp, and who has supervision of the medical work of the camp and general charge of the sanitary situation. Under his direction is the Camp Sanitary Inspector, an officer of the Medical or Sanitary Corps, whose duty it is to make a thorough daily inspection of the camp and report, through the Camp Surgeon to the permanent Camp Commander, any breaches of sanitation that cannot be rectified locally.

In the base where I am on duty the Chief Surgeon has been instrumental in obtaining an order from the Commanding General of the section turning over to each camp police officer for sanitary work each day details from line troops according to the following schedule :

up	to	1000				2	o/o	of	entire	command		
1000	to	5000	1/2	1/2	o/o	"	"		"			
5000	to	1000				1	o/o	"	"		"	
10000	and	over				1/2	o/o	"	"		"	

For all other troops and detachments 2 men per organization (G. O., 41., Hq. B. S. 2).

These men perform the duties of sanitary squads. The system has worked out most satisfactorily. It must be said that the co-operation of line officers in sanitary work, from commanding generals down to junior subaltern, has been excellent. Our old officers of the former regular army have through years of experience seen the necessity for the observance of sanitary rules, and officers of less practical knowledge, by the courses on field and camp sanitation and care of troops, have been taught the need of maintaining their men in good physical condition. As a rule, poor camp sanitation, with its sequella of communicable disease, is an indication of igno-

rance or lack of attention to sanitary principles on the part of the medical officer rather than officers of the line. The strong or weak link in the sanitary chain is the regimental or camp surgeon. Our medical schools at home have turned out good physicians and surgeons capable of good performance when called into military service, provided they are assigned to hospital work. In the ordinary medical school, however, little attention is paid to the subject of hygiene and sanitation. The average student regards the subject as a useless bore, and usually passes the examination by a night's cramming, proceeding to forget it as soon as possible thereafter. Military sanitation is usually not touched upon at all, in consequence of which most medical officers come to the army untrained in this most important subject, and entirely unfamiliar with its principles. With the present raw and comparatively undisciplined state of our troops, fresh from concentration camps, much of our work of organization, and I may say its most important part consists in the education of medical officers assigned to duty with the various combatant or labor organizations.

Central control: The office organization, elaborated by the Chief Surgeon of Base Section N° 2., is illustrated in the accompanying diagram. It is an old army axiom that the success or failure of a command rests with the man at the top whose skill in administration and in the selection of his assistants determines the future of his project. In this case the Chief Surgeon is responsible for ideas, subordinates for carrying them out. Each assistant is responsible for the work in his department and it is handled by him so far as he is able, unless some advice on the part of the Chief Surgeon is required. Information covering the activities of the various sub-departments is obtained by means of conferences several times a week, at which each officer gives a brief summary of the current work of his department, and the ideas of the various assistants are thus correlated and exchanged.

Education: Various orders, bulletins, circulars and memoranda prepared in the Chief Surgeon's office, usually by the Director of the Base Laboratory or his assistant the Base Epidemiologist, are published from time to time for the information of medical officers throughout the base. These usually take the form of various health bulletins, or may follow the plan of circulars from the Office of the Chief Surgeon, A. E. F. They aim to call attention in advance to diseases which may be expected to prevail during various seasons, and through them an effort is made not only to acquaint officers with epidemiological conditions prevailing throughout the section but actually to educate them in the etiology, diagnosis and

treatment of various preventable illnesses: for instance, bulletins have been furnished on the subjects of dysentery in its various forms. Vincent's angina, angina, fever of undetermined origin three day fever, and one on pneumonia is now in process of preparation. These are all of considerable interest and value to medical officers, situated at a distance from headquarters, in keeping them informed of diseases to be expected throughout their area. Where the seriousness of the situation warrants it the Commanding General publishes certain of these in the form of a general order, thus lending to the recommendation the force of military authority. Along similar lines is the issue of blue prints and diagrams of various forms of sanitary apparatus and appliances, including pit and tinette type latrines, grease traps, dumps, food cabinets and cold storage boxes. These are forwarded to all camps and are simple of construction and accompanied by sufficient directions to make their establishment easy.

In line with the system of office conferences, mentioned above, are our monthly meetings of medical officers within access of the section headquarters. These are planned with the idea of acquainting officers on duty in camps or with troops of the sanitary needs and service of the base, with special reference to prevailing preventable disease. At these meetings pertinent medical topics are discussed and they have a definite value in augmenting the spirit of co-operation among medical officers, and establishing among them a feeling that the Chief Surgeon's Office is doing its share in aiding them in their work.

Through the co-operation of the commanding officer and senior officers on duty at one of the base hospitals near our headquarters, a post graduate medical school has been established for the benefit of any medical officers who may be in rest camps or temporarily attached to units in the neighborhood awaiting definite assignment elsewhere. As this particular hospital is one of the largest in our army, there is always an opportunity for such officers to be temporarily assigned there and for them to work as dressers or assistants in wards. A course of lectures, demonstrations, and bedside teachings have been organized by Major Richard C. Cabbot and his assistants, by means of which these officers derive exceedingly valuable instruction from some of our best American teachers. Meanwhile they are given lectures and demonstrations on sanitary topics and are taken at intervals to the various camps in the neighborhood and the good and bad points of sanitation there existing are shown them. This is really one of the most satisfactory branches of our work and I have yet to see a medical officer who

attended this little school who did not speak in the highest praise of the efforts shown there to assist him in his work in France.

The question of inspection will be considered later. It may be noted here, however, that one of the most important functions of all inspecting officers is to give the maximum amount of information and advice rather than useless criticism. It is most satisfying for an inspector to be told upon his return to an outlying station that his advice has resulted in local improvement.

Billets : When billets are being selected for troops about to arrive, a medical officer accompanies the billeting officer on his round through the various villages. Billets are selected with due consideration for sanitary needs and the proper attention is paid to medical opinion. Arrangement has been made by which the proper sanitary appliances are kept on hand by the Base Quartermaster and placed in billeting areas in advance of the arrival of troops. Latrine boxes, crude oil and sprayers, garbage and latrine cans, fly traps, burlap and lumber are supplied in sufficient quantities according to a schedule worked out on a percentage basis, with reference to the number of troops due to occupy the village or town. Incoming troops, therefore, find no excuse upon arrival for sanitary derelictions. They are met or seen shortly after arrival by the Medical Inspector of Billets who furnishes information on sanitary subjects, gives advice as to local problems, informs medical officers relative to procedure for obtaining medical supplies and leaves copies of a sanitary memorandum covering the subjects of latrines, urine cans, garbage and refuse disposal, and the care of kitchens and incinerators.

Inspections : Routine monthly inspections covering the medical and sanitary features of all activities in the base are made regularly by the Base Sanitary Inspector. At these visits he notes particularly the disposal of wastes, cleanliness and care of kitchens, mess halls and garbage receptacles, construction of latrines, methods of urine disposal, manure dumps, incinerators and fly prevention and extermination. He renders an informal report to the Chief Surgeon covering each camp inspected; in addition one of his main functions is to teach the more inexperienced medical officers the general principles of camp and field sanitation, and to take up with them their local problems and assist in their solution. The Base Medical Consultant makes similar monthly rounds, preferably at the same time as those of the Sanitary Inspector. While the Sanitary Inspector is investigating the details covering preventive medicine, the Base Medical Consultant goes through the hospitals or infirmary wards, checks up the diagnosis and treatment of cases

and obtains valuable information relative to the frequency of certain phases of disease which may have occurred not only among patients admitted to hospital but among those applying for treatment at sick-call and not marked sick upon the sick records. If any data of epidemiological interest is found, it is transmitted to the Base Epidemiologist upon the conclusion of his inspection trip. The Medical Inspector of Billets makes weekly inspection of the troop areas under his care. He acts as special advisor to all the medical officers stationed with troops in villages. Usually these troops are among the latest arrivals in the base and know less how to care for themselves than the men who have passed through this period and have become established in training camps or centers. For that reason the Medical Inspector of Billets should be a man of considerable experience in field work and possessed of administrative ability, intelligence, and tact. His position is one of the most important of the administrative force since his clientele are apt to be untrained and inexperienced and changing from week to week.

Frequent inspections are made by the Chief Surgeon or his assistant to keep themselves personally informed of conditions in general throughout the section and for the purpose of seeing medical officers at work. The successful administrator should keep his assistants as busy as possible, leaving himself free for the greater part of each day to plan the solution of new problems. If he can visit one camp or billet a day in addition, his time is counted well spent.

Special inspections may be called for on account of reports of sanitary delinquencies or the presence of preventable disease. The Sanitary Inspector is called on frequently to make such trips. However rigid routine inspections may be, or however carefully the Chief Surgeon may supervise his base, there will be conditions reported from time to time which necessitate an immediate visit from some qualified medical officer. This takes up a large part of the Sanitary Inspector's time. In our base section it is estimated that the Sanitary Inspector can make the necessary trip to each formation now existing in the base, exclusive of billeting areas, once each month, and can cover the entire situation in a period of three weeks, this by means of constant travelling and allowing no time for him to digest the results of his trips and make his reports, except by working at night. The remaining week would be fully occupied by the examination of the routine monthly sanitary reports submitted to the Chief Surgeon's office each month, from all organizations in the area, in addition to which he may be called upon

for special inspections. The office personnel should be of sufficient size to count upon a regular visit each month, as above, in which case an assistant would probably be necessary to aid in this work and the special inspection trips. In the presence of epidemics or threatened epidemics, the Base Epidemiologist or his assistant, usually with the Director of the Base Laboratory, proceeds at once to the spot. An additional medical officer trained in laboratory work, with a portable field laboratory outfit, is often called into service. The Base Medical Consultant is sometimes called upon for similar work, but his particular role is as consultant in the diagnosis and care of medical cases. He is not so apt to be called upon to make inspection trips of this character unless unusual medical conditions present themselves or there is some question as to the proper care of the sick.

While it is realized that these remarks have perhaps diverged from the actual question of feces disposal and fly prevention in a base section, it is hoped that they may have been of some value by giving an insight into the administrative difficulties involved in caring for a large base and showing what steps are being taken to hold the situation in hand. To summarize, it may be said that success depends upon :

First : An efficient and well thought out central organization with definite duties assigned to each assistant, and the correlation of individual ideas and experience by means of frequent conferences.

Second : Education of relatively untrained medical officers.

Third : Advance preparation of camps and billets and the initiation of proper efforts to give newly arrived troops a good start.

Fourth : Frequent inspections, to prevent the formation, and effect the correction, of insanitary habits.

Discussion.

Major Zinsser was asked by Colonel Gressinger to state the results of the bacteriological examination of the feces in the cases of diarrhea which he had studied. He said that the examination was not complete but it showed very definitely that the disease was of a bacillary nature. There were thousands of cases, and only the severe ones were picked out and sent to a hospital where they were studied clinically and the early stools examined. The methods used were the simple methods used for army work. The result of one series of examinations showed that out of 35 cases, 2 were paratyphoid. A great many cases showed a curious organism which he hoped to study more carefully because he had never

seen it before: it did not correspond to any of the ordinary types one sees in feces, though it was like dysentery or typhoid organisms. He said that he had left instructions to do about 300 more stools. There was some question of the diarrhea coming from infected food, but he did not know what was found subsequently. He thought, however, that with conditions such as those just described every kind of epidemic might be expected, and he suggested protecting the men by vaccination whenever possible.

Captain Moss asked to be excused from discussing the subject of fighting flies and disposing of feces in France. He said he should feel very badly to think that epidemic diseases were spreading into advanced areas, and very humiliated to think that they started in base sections. He believed there was no necessity of discussing general principles about flies and feces, nor the matter of expediency. There was little to say about this problem at a base section that would be of interest. Various methods which seemed to be satisfactory had been tried, but conditions were very different from those in the front area.

Captain Moss said he should like, however, to say a word about dysentery. There had been reports of dysentery from a number of localities in his base section. Diarrhea had occurred in some places in considerable amounts; it had not been found possible to go out and make a diagnosis in every case, but each locality where diarrhea was prevalent had been visited to determine whether the outbreak was dysentery or not. In every instance a sufficient number of specimens had been obtained, and dysentery bacilli isolated from the stools. This had not occurred in every case, but out of 20 specimens of dysentery, 5 or 10 cases gave evidence that it was true dysentery.

Observations in these cases led to the belief that the epidemics were fly-borne. Water throughout the base sections was being conscientiously chlorinated and there was no reason to believe that the dysentery was anything but fly-borne.

Any success that he and his colleagues had had in dealing with epidemics of this kind had been very largely due to the splendid co-operation of the Commanding General. He had been willing to take circulars or bulletins, which had been prepared, and put them out under the form of general orders and over his signature. We had tried to carry out the method of anticipation, — preparation, co-operation, and investigation — to make provision a little in advance, and to get out circulars on diseases for which the medical officer was on the watch. An attempt had been made to

get ready to supply any demands which the appearance of those diseases might cause the medical officer to make upon the base regions. If the diseases did occur, there would be co-operation with the medical officer in the diagnosis. This had already been done in the case of dysentery, meningitis, pneumonia, etc.

Base sections in other parts of France had received warning from circulars which had preceded the diseases, and the speaker believed that if some educational policy could be carried out before the winter came on, a great deal in preventive medicine would be accomplished.

The speaker asked Colonel Siler to give his views.

Colonel Siler said that his office was now getting reports from the base hospitals through which the men were evacuated. Two days previously 5 cases of typhoid and 12 cases of dysentery had been reported. The latter had not yet been confirmed bacteriologically, but they were doubtless cases of dysentery. Careful investigation showed absolutely no dysentery of previous attacks; they were all primary cases. Colonel Siler also said that a number of cases of dysentery had been proved to be due to the entamoeba hystoliticus, and suggested that there might be many more cases of that type.

Médecin-Major Rist said he could confirm what Colonel Siler said. The French physicians had been surprised to find that a great number of cases, which at the beginning were thought to be bacillus cases, were in reality primary dysentery.

Colonel Cummins said that the British medical officers had found an organism which was probably the one mentioned by Major Zinsser. This organism can be definitely set aside on account of its strange fishy odor.

This year it had been arranged that cases of diarrhea occurring in a division should be brought to the field ambulance at once. The command does not want to lose the men from the division; therefore, instead of sending them to the clearing station, those who are comparatively slight cases are kept in the field ambulance. Swabs are taken and sent to the bacteriologist by a motor cyclist. One motor cyclist can carry about 100 dysentery swabs at a time. The bacteriologist deals with these swabs at once and generally submits his report within 4 or 6 hours. This system has enabled the authorities more and more to find the dysentery cases among the diarrhea cases, but not to a complete extent, because in the case of diarrhea dysentery as in the case of clinical dysentery the men do not report. In one army, from the divisisions that followed

instructions, there was as much as 23 o/o of dysentery positive findings from the cases of diarrhea examined.

Instructions had been given to get all cases of diarrhea brought in and observed. As a result a considerable number of diarrhea cases had been removed from the line and it had been found necessary to send a lot of them back to the base because solid food brought on looseness of the bowels very quickly again. If these cases had not been treated they would have relapsed into dysentery and become chronic.

If all cases of diarrhea can be examined and treated this year, the number will probably be diminished next year.

At the present moment there are a number of cases of dysentery or suspected dysentery. Evacuation to England is prevented because it is considered that these men will soon get well if properly treated.

Many cases of minor illness are kept back, which last year would have been evacuated to England and the majority of them can be cured within one month.

In regard to the question of sanitation, which is so important, the speaker said that it was a very good thing to say " Stop the flies, destroy the flies ". The speaker advocated fly destruction in every way, but we must bear in mind the principle that the fly is merely an instrument in the transmission of infected matter to food. The importance of flies is enormous, but the importance of feces is far greater. So many agents besides flies are important, for instance, the men's boots. When walking over a bad system of latrine a man will come back with his boots foul; he will lie down among other men and rub his boots on them, or he will take his boots off, thereby bringing his hands in contact with them.

The covering up of food to protect it from flies is very important, but the great thing is to remember what food ought to be covered up. It is a very good thing to see a screened meat-safe, but the joints of meat that are in it will be cooked, while outside the screen you may see cheese, sugar, etc., which are not to be cooked. Food that is not to be cooked should be covered. One is prescribing means and not ends.

If a kitchen has good sanitation, but in the mess-room jam is uncovered, sugar exposed, and bread uncovered, the good sanitation of the cook is lost to a certain extent. The authorities should think of what they are aiming at rather than concentrate on one particular example.

NOTES FROM THE FIELD SERVICE SCHOOL FOR MEDICAL OFFICERS OF THE AMERICAN EXPEDITIONARY FORCES

CONVALESCENT CAMPS

Report of a lecture by Col. Baily K. Ashford, M. C., to the Field Service School for Medical Officers of the A. E. F.

General Plan. A convalescent camp should be carefully laid out and should be a barrack and not a tent affair. The site should be pleasant and healthful; above all it should be in the country away from all other centers, with plenty of room to expand. It should communicate by good roads with necessary centers, and should be laid out with a view to ornateness, with well turfed lawns, and abundant shade, with gardens and flowers, and with good walks which should include surroundings that would be pleasing to the eye and which would lead into the open country. These camps should accommodate from two thousand to three thousand men, who should be divided into companies of 250 each, under the immediate charge of experienced non-commissioned officers. There should be regular hours for meals, and such formations as are decided upon should be observed with military exactness. Great care should be taken at these places to provide for the men all military comforts and necessities with a minimum amount of the annoying petty details of a soldier's life. For example: the barrack itself. This should be attractively painted, with stained floor and stained rafters; with kalsomined walls and ceiling. It is an enormous advantage to have the floors waxed, or at least oiled. Beds are by no means a necessity; a straw mattress with a sufficient number of blankets, and a set of hooks and shelves above each man's head for his clothing and equipment being quite sufficient, *provided* the barrack itself is spotlessly clean, neat and attractive. The chill should be taken off the barrack by enough stoves, but the stuffy heat without ventilation, too often seen in such barracks, should be prevented. The men should sleep with the windows wide open. Both latrines and baths should be accessible and these should be as clean and as decent as the sleeping quarters.

There should be at each one of these convalescent camps an

excellent quartermaster storehouse where an ample supply of clothing, field equipment, etc., should be kept at all times, so that no man need go dirty or slouchy, and every man when he goes away may be properly equipped to join his organization. There should be certain features about this quartermaster's storehouse that might with benefit be much more elaborate and detailed than in one of an ordinary depot type. Here considerable effort should be made to provide shoes that will fit the men. This work, begun by our medical corps in times of peace in our country and with such success, finds a peculiarly important mission to perform at these convalescent camps. In connection with these storehouses there should be a set of shops which could be used for the employment of men in the army who have become partially disabled for front line service — the so-called "B" men. Two such men should be permanently assigned here as tailors, and their shops should be used not only for the convenience of the men, but for the instruction of certain convalescents who will probably be unable to return to the fighting lines, and who may be advantageously placed in the lines of communication for the good of the army when they are sufficiently trained. This same policy should apply to all other industrial shops, which should form a feature of a convalescent camp. Thus a practical outcome of these camps will be a provision for training schools for artisans needed in the army. There should be, therefore, cobblers, tinsmiths, electricians, carpenters, blacksmiths, leather workers, laundrymen, cooks, musicians for bands, and others trained here.

The bathing, disinfecting and laundry systems should be unusually complete. In addition to the usual care taken to cleanse and disinfect the soldier upon his arrival, means should be provided to keep him clean and neat until he goes away. A delouser should be kept at this plant, which should be central and accessible, and the belongings of all men should be disinfected once a week. In addition to showers it is well to afford other varieties of baths. For instance, we noted in some of the convalescent camps that cement baths had been sunk in the floor for about a foot, underneath the shower, and that these baths were curtained off and made individual; both hot and cold water were available. It is well to have also a room for a Turkish bath; but the men should be made to go in groups to prevent accident, and a cool or temperate shower should be exacted of every man bathing thus before leaving the establishment. The baths should have attendants well versed in skin disease to pick out men who are lousy, who have the itch, or some other contagious disease of the skin. Fresh

clothing should be freely supplied, as well as soap and towels. There should be a good barber shop in connection with this bath where men should not be required to pay for the cutting of their hair, although a small charge could be made for shaving and shampooing. A good chiropodist should also be on duty at the baths.

Above all, these baths should be scrupulously clean, and the men should be shown that the army can and will provide better bathing establishments than those for which high prices are paid in cities under conditions of peace. In this connection it is believed that the Section d'Hygiene Corporelle of the French could be used with advantage as the basis for American bathing establishment.

Some provision should be made for a good laundry, and this should be in charge of an experienced laundryman. No women should be employed at this place. It is believed that the sterilizing of clothing could best be accomplished either by the Herscher apparatus of the French or the Fodden Thresh of the English. By this time there may be some steam sterilizing apparatus on the plan of the Kny-Scheerer made in our own country.

Feeding the Men. The feeding of the men requires a very highly specialized department. The kitchen should be a large one, well ventilated, attractive, and furnished with a sufficient number of stoves to permit the cooks to devote themselves to specialties. There should be stoves for stews, stoves for baking, stoves for pastry, pies, cakes, etc., each being separate and each having its own cook. In this way there is great improvement in the quality of the food.

It was brought very forcibly to my attention that the method of the British at Boulogne in feeding the men should be copied in the interest of economy in our own service. All men should be given to understand at the outset that they can have all that they want to eat, and just as many helps as they want, but that it is their duty never to take more on their plates than they think will satisfy their appetites, and that they are sure they are going to eat. The kitchens adjoin the dining hall, a long counter for serving the men with food being interposed.

The men are introduced into the dining hall by companies, five minutes apart, instead of sitting them all at once. On entering the hall each man is given eating utensils, cups, plates, and paper napkins from the store of the mess hall. Armed with these he proceeds, after the manner of a Childs' restaurant, to the counter mentioned. By enlisting the co-operation of the men to the end that no more food will be taken on the plate than is needed, I was told by the commanding officer of one of the camps that ten

thousand pounds a year was saved in food which had previously been wasted by the portioning out of fixed amounts to each man.

In connection with this kitchen there are two important side issues. One is the convalescent camp garden. In general terms a convalescent camp should produce all the vegetables it needs for its own support, but this garden should be utilized for the employment of men who will not go back to the firing line, rather than for the men who simply need to be rapidly built up for duty at the front. The distinction is thus made for the following reason: men who are to go back in a short time to the conditions of trench warfare should not be allowed to browse about too long in agricultural pursuits; their military life should be kept before them at all times. As one commanding officer of these camps states, "It seems like when they get into a garden they get to thinking what a terrible thing war is". We don't mind this in the case of the permanent base men, but we don't want to make our men who have to go back to the front feel bad unnecessarily.

The other adjunct is the conservation of food.

First, *Fat Conservation*: This is important for two reasons: (1) it provides suet for cooking, and (2) it serves as a source of much material for certain munitions of war. The first necessity is subserved by the saving and rendering of fat trimmed from meat and taken from plates of men who have not consumed all that has been served them. The second is obtained from the fats of the kitchen waste, the garbage, and the scourings from kitchen sinks. This non-edible fat is rendered and is shipped in 300 pound casks to a salvage depot. The English render these fats on Soyer stoves which are excellent for the purpose. The important part of this conservation is that the organization is paid a few cents a pound by the Ordnance Department for all fat thus saved for munitions.

Second, *Conservation of Food Scraps*: An enormous amount of meat and bread can be conserved for the making of hash, rissoles and other dishes. It is noteworthy that these big kitchens have very few garbage cans— only one or two for a kitchen serving two to three thousand men.

Third, *Conservation of Solder from Tins*: At several convalescent depots we saw a large melting pot into which were thrown all tin cans. A hot fire was lighted two or three times a day and the solder allowed to run out through a funnel in the bottom. This was an important source of revenue for the camp, as the lead was sold in sticks of solder to the Government.

These camps require the most exacting sort of a sanitary officer. They should be models of sanitation. There should be night urin-

als placed between all barracks and, as before referred to, the latrines should be as perfect as it is possible to make them. Personally, I believe that the best possible disposition of feces at these camps is by incineration, and there is no objection at all to having these incinerators used for kitchen waste as well as feces; it will depend entirely upon the cleanliness of the latrine as to how near it can be placed to a kitchen. The pail system was so run in the British service that never in all of my many visits to their institutions have I smelt feces or seen filth in connection with such a system. Of course, a good sewer system is best, but it will be rarely possible to attain. Fly-proof boxes for deep pits, after the American plan, is a possibility in certain terrain and is preferred by many British to their bucket latrine. The great point is that it is not only sanitation that we are after, but we are trying to preserve the sanitary conscience of our soldiers by appealing to their sense of decency. Therefore, these places should be always free from odor, always spotlessly clean, always provided with a comfortable seat and good paper with which the men may cleanse themselves. The urine should be allowed to flow away into a soakage pit and an orderly should always be stationed on duty in charge of the latrine and the incinerator serving it.

As to the amount of fuel required for incinerator, as will be seen from many papers issued by this school, that quantity is negligible. With a good camp refuse conservancy system, two pounds of coke a day per incinerator for starting the fire is sufficient. But all camp refuse should be promptly dumped here daily.

The morning ablutions of the soldiers should be provided for by ablution benches, under cover, and with hot water for shaving. These can be near the latrine and the hot water obtained from pipes running through the fire box of the incinerator. In fact a wash house for hands and face is best located in this vicinity.

It should be emphasized that there is no part of the up-keep and the daily service of a convalescent camp which should not be run by the convalescents themselves; gradually a permanent detail will be formed from P. B. men who cannot go back to the front, men who have shown themselves to be particularly well prepared for identification with one or another of the services in the camp, and who will always serve as nuclei around which men for these services will be grouped. The commanding officer will inculcate in these men, in addition to the strictest regard for military discipline, a decent regard for the ornate, and, as a result thereof, for the clean and neat. It should be deliberately taught men that it is not enough merely to have the " rough stuff ", the

bare necessities; that men should improve their condition; that they should keep themselves and their surroundings clean if they expect to keep well; that they should keep their initiative, their ambition, their imagination active; that to make their barracks, their reading rooms, their camp, attractive to the eye is to preserve those illusions of life which are necessary to make them contented and happy.

Entertainments. It should be noted that all too frequently the poorest form of entertainment for a soldier is the formula which somebody else has provided him to enjoy himself by. The most perfect entertainments that we have seen since we have been in France, generally vaudeville it is true, but some serious concerts, have been provided by the soldiers. The programs they have made up themselves from jokes which nobody ever wrote and from bits of waggery which you do not always find among professional comedians. The American people are especially gifted with a keen sense of humor, and we never see any humor keener than that displayed by our own healthy and care-free soldiers at the front. Civil societies who have taken unto themselves the diversion of the soldier can do their best work at these camps by providing the wherewithal for the soldier himself, and quite in his own way, to furnish his own amusement. Such entertainments "hand made" by the soldier himself, plus the excellent ones provided so lavishly by our patriotic professional artists, musicians, and orators, work marvels in keeping a normal and healthful psychology among our men.

For a camp of 2,500 there should be at least one drum and fife corps, two brass bands, one orchestra, and one mandolin, guitar and banjo club. By furnishing the instruments for these bands there never will be a dearth of musicians, and, as has been intimated previously, these camps can be a source of unborn bands for military services. The English made the great mistake of losing a great many of their bands, and in a general way it can be said that with music and healthful theatrical entertainment the spirits of the men never flag. Bands have an enormous influence in reviving the drooping spirits of men, and it is at these camps that such an influence is most needed. There should be some systematic effort, however, to train bands (here, and just as there are trainers for physical exercises to be spoken of later) there should be trainers in music and theatricals. There should be always plenty of music; the drills, games, etc., should be accompanied by music; there should be a drum and fife corps for parade, a band for retreat, and an orchestra for evening entertainments and dancing. There should be some *music*, good music, and not always merely a more

or less agreeable noise. In addition to the amusement offered by bands, systematic effort should be made to draw out the men to take part in the theatrical entertainments above referred to. This requires a considerable amount of tact on the part of the commanding officer and really should receive the constant attention of some one person, because sometimes the most talented entertainers will go clear through a camp without displaying an iota of native ability, which they have to a very high degree, if properly brought out. Some of the best comedians we have seen have been quite accidentally discovered at these places. For these theatrical entertainments and minstrelsy, to which the American soldier takes very kindly, costumes should be freely supplied by the same patriotic civil societies who furnish the instruments for the bands.

Nor should these societies neglect to provide club rooms for non-commissioned officers and for men, reading rooms, writing rooms, libraries, and a good gymnasium where manly sports can be taught and practiced — boxing, wrestling, fencing, etc.

A sporting goods exchange should be provided where golf clubs, tennis rackets, bats, balls, and all the paraphanalia that indoor and outdoor sports require can be obtained. Some of the more expensive things should be rented; some things, like tennis balls, base balls, etc., sold.

This is an enormously important feature of these camps, and here it is that these civil societies can be seen at their best. For instance, it is believed that in the exercises and the games which they are taught, regular physical trainers should be employed rather than army sergeants, for the simple reason that when men are being drilled by an army sergeant or any one to whom they are in a military sense beholden, the tension of military discipline at these games, after the manner of a drill, places the muscles in abnormal positions and under tension instead of relaxing them and freeing them from strain, which should be the object in exercising men for their physical good. These trainers should be good mixers and must learn how to tell when a man is bored or tired. Before the period of physical tire comes the mental tire should be recognized, and if it cannot be gotten rid of by personal address the man should be switched rapidly to some other form of game or exercise. These games and exercises should be held at fixed hours, and medical officers on duty at the camp should always be on hand among the groups to see that everything goes well. Regarding this participation of civil societies, it is believed that it is the manifest destiny of the Red Cross to take hold of this matter inasmuch as this is a medical unit and is being used to return the soldier fit to the lines; in

other words, this is a good opportunity for the Red Cross to co-operate actively with the medical corps, and not merely to furnish candy and cigarettes. For this purpose not more than two experienced and matter of fact middle-aged women of the Red Cross society should preside in a hut in which indoor games, checkers, whist, billiards, etc., could be conducted, little tables for writing provided, etc.

In other words, the whole spirit should be to make a man as comfortable as he can be and amuse him; at the same time he is being kept in a military atmosphere. There should not be too many orders, but general good discipline should be exacted, especially as regards cleanliness of person and surroundings, the rendering of proper salutes and the punctual attendance upon all formations. Loafers should always be kept busy at something.

The Professional Care of Men : Men should be given one general examination when they come in but they should not be examined too often — every five or six days is enough. Men who have disordered action of the heart should be gone over carefully, and if the surgeon is satisfied that there is nothing the matter with their hearts, of an organic nature, he should not repeat the examination again unless absolutely obliged to do so from symptoms. In other words, it is not wise to have attention drawn to organic diseases at these centers. In fact the whole atmosphere of treatment — medicine, disease etc., should be avoided. The spirit of the place should be " Here is the place for men to get fit in, and you need it. It depends on yourself how soon you fit yourself for the duties of a man ". As a matter of fact, in most of these convalescent camps there were very few actually in bed. In one (which cared for 3,000 men) there was only one hut which was known as a sick bay and that was empty but for one man. A powerful influence is the grading of men into the weaklings, those able to do something, and those who are getting husky and can do about everything. A spirit of self betterment is thus fostered by appeal to the pride of the man.

As a matter of fact these convalescent camps should be toward the rear, especially near large towns, although such centers will have to be placed near important bases for men who come to us sick from the States or who sicken after they get here. It seems that there are at least five kinds of institutions that could be grouped under this general heading " Convalescent Camps ", and that these institutions could all be administered along certain broad basic principles identical for all.

(1) A convalescent camp for the sick convalescents from disease,

not venereal or neurological. All base hospitals should have or be near one of these.

(2) A convalescent camp to which men of (1) can be sent a few weeks after for hardening in order to enable them to return to the front. This camp could also receive men from the divisions direct who need a rest and change to prevent their breakdown.

(3) A camp for the correction of vicious postures and results of war wounds requiring re-education and prescribed exercises.

(4) A camp for the handling of war neuroses,

(5) A venereal labor camp.

ABSTRACTS

SURGERY

Surgical Shock and Some Related Problems. By J. E. SWEET. *American Journal of the Medical Sciences.* Philadelphia, May, 1918, Vol. CLV, No. 5, pp. 625-639.

Sweet says there is a tendency to dislocate physiology from clinical medicine, and makes emphatic the point that a surgeon must know as much as any man in any branch of medicine.

He defines shock as a bleeding to death in the venous system of the body; that is, that in shock the blood collects in the veins, chiefly of the splanchnic system, and the patient dies because the blood fails to reach the right heart. The role played in the condition of shock by hydrostatic pressure is not clear, but it is a actor which cannot be ignored. What we commonly call blood pressure is the tension of the vessel wall produced by the systole of the ventricle and transmitted by an incompressible fluid.

He defines syncope as a condition in which the blood pressure falls because the great automatic centers are cut off short. Collapse is defined by him as a condition in which, by the phenomenon called cardiac inhibition, the machinery of the circulation falls. Here vasomotor stimulation is not indicated; saline infusion, bandaging of the extremities, perfusion of the blood — all this is contra-indicated; the engine is stalled, and putting on more load will not start it. In fact it is not unlikely that a venesection would be of more help in this condition than any effort which

would increase the burden of the heart. Concerning hemorrhage he says, " without denying that loss of blood may be a factor in the production of the shock, which appeals to my mind as true surgical shock, I still object to grouping deaths due to hemorrhage under the caption of deaths due to shock. Death occurs after hemorrhage and because the patient bleeds to death ".

He defines true surgical shock as a condition marked by a gradual, persistent, progressive fall of blood pressure, such as characterizes certain cases after extensive crush injury with practically no loss of blood, cases of extensive burns, and many intra-abdominal conditions; these are, in his opinion, instances of primary failure of the peripheral vasomotor mechanism and are associated in some manner with a disturbance of adrenal function. By experimentation the condition which compares with surgical shock can be produced by the complete removal of both adrenals. From the practical side adrenalin has proved valuable in the treatment of this condition.

His ideas of shock are entirely compatible with the treatment of Porter (*Boston Medical and Surgical Journal*, 1916). Porter, as a result of his studies of shock at the front, advises :

1. A special position of the wounded so that the abdominal vessels shall be higher than the heart and brain (in other words, counteract the effect of hydrostatic pressure).

2. Heat. (The use of heat in shock is not clear to me. It seems like the empirical combating of a symptom, but is universally used.)

3. Intravenous injection of saline solution.

4. Intravenous injection of epinephrin.

5. The transfusion of blood in certain cases.

6. The observation of the diastatic pressure every half hour, as an index of the condition of the patient.

The Principle of Blood Grouping Applied to Skin Grafting. H. K. Shawan, Captain, M. R. C., U. S. A. Preliminary note on a paper which will be published elsewhere.

Grafts may be classified as : (1) Autografts, where the skin is transplanted from the same individual; (2) isografts, where the skin is obtained from another person; and (3) zoo-grafts, where the graft is taken from one of the lower animals. All observers agree that the autograft is the most satisfactory. A permanent " take " is least likely and is sometimes impossible to obtain with zoo-grafts. In the case of isografts, such uncertain results have

been obtained that many surgeons have been led to abandon their use.

Whether partial or total thicknesses of skin were used, a peculiar phenomenon has frequently been observed in the use of isografts. In the course of the second to the fourth week, a certain percentage of these apparently healthy primary takes begin a slight desquamation of the epidermis, then they show signs of resorption by becoming smaller, paler and thinner, and shortly are either reduced to a mere bluish pellicle or have completely disappeared. The grafts had apparently faded or melted away little by little. Having had similar experiences, and having seen the uniformly successful results obtained in blood transfusion with matched blood, it occurred to me that the failure in permanent success of isodermic grafts might be in part dependent on the same underlying principles.

Summary :

1. Autografts grow best.

2. Isografts, obtained from donors of the same blood group as the recipient, or from Group IV donors, became permanent "takes" and grew almost, if not equally, as autografts.

3. Isografts, where the donor and recipient were of different groups, did not remain as permanent growths except when Group IV skin was used or when the recipient was a member of Group I.

4. Group I grew permanent skin from donors of all of the four groups and apparently equally well.

5. Group IV skin grew permanently on recipients of all groups, but only isografts and autografts remained as permanent "takes" on them.

6. It appears that skin grafting obeys the principle of blood grouping, as in the transfusion of blood.

Biological Study in the Action of Alkali and Hypochlorite Solution in the Treatment of War Wounds. By Noel Fiessinger and René Clogne, *Revue de Chirurgie*, September-October, 1917.

Any one who has seen wounds treated by débridement followed by Dakin's solution, as advised by Carrel; any one who has seen the dead tissues separate in a few days under this treatment; who has seen the purulent discharge disappear; healthy red granulations appear; and successful secondary sutures made possible between the sixth and fifteenth days, must agree with the favorable reports of Quenu, Pozzi, and Tuffier. Delbet has expressed the view that

this solution of Dakin does not act as a sterilizing fluid and the authors, as a result of their work, have reached a similar conclusion. *Hypochlorites in the strength employed have very slight sterilizing power, but as chemical cleansing agents, by proteolysis, they act most energetically.*

Carrel and Ochelly, in their experimental work, showed that the germicidal action of Dakin's solution diminished most markedly in the presence of serum.

Fiessinger and Clogne find that in concentrated albuminous media the germicidal power of Dakin's is almost negligible, as tested *in vitro* on staphyloccus and B. mycoides. In the presence of pus, Dakin's solution in small amounts proportion of 2 in 10 favors growth of bacteria: in larger amounts (proportion of 6 in 10 it holds growth in check: in very large amounts (proportion of 9 in 10) it destroys bacterial growth. When the infection is introduced into excised tissues and they are treated with Dakin's, provided large amounts of solution are used (much larger than recommended by Carrel), the surface may be sterilized. Rarely can adequate amounts of the solution be employed clinically without an inundation. Clinical experience shows that anaerobes and aerobes persist as long as the wounds contain necrotic tissue, despite regular use of Dakin's solution. Dakin's solution on the other hand undoubtedly hastens the separation of these sloughs and in this way diminishes the bacterial content of wounds.

Note on the Treatment of Gangrene Infection of War Wounds. L. Ombredanne. *Bulletin et Mémoires de la Société de Chirurgie de Paris.* Vol. XLI. N° 4.

After a very large debridement and removal of projectiles and foreign bodies, and after making parallel incisions in the whole area of crepitation, the author washes out the wound with ether, plugging it with gauze filled with ether; gauze with ether is packed under the strips of skin, ether compresses are applied on the teguments, and the whole thing is covered up with a rubber cloth.

The dressing is changed completely, morning and night, for three or four days.

The results have been wonderful, and infection has been stopped in every case within three to six days

The Carrying of Wounded in Trenches. By Lieut. B. Graves. R. A. M. C., *Journal of Royal Army Medical Corps*, April, 1918. Vol. XXX, No. 4, page 432.

Compactness is the first essential for the transportation of wounded from a fire trench. In the majority of cases no harm will result to an injured man by flexion of the legs, provided that his body is maintained in a position of reasonable comfort without any auxiliary effort on his part.

The task of the stretcher bearer is one which is exceedingly tiring and arduous, and any device which will lessen the difficulty will greatly increase the efficiency with which the task is carried out.

In sections of trenches where the ordinary stretcher cannot possibly be utilized, resort has been made to a rubber ground sheet upon which the patient has been dragged until the difficult part has been covered. An improvement upon this is a sheet of canvas with a rope ring at each of its corners. It is a good plan to place such a sheet upon the stretcher before the placing of the patient, thus facilitating his removal if, and when, it becomes necessary.

The vertical position, of course, occupies the least space. The difficulty connected with this is that, while the patient's feet must of necessity clear the ground, his head is often unduly exposed to fire. A similar objection pertains to the hammock carried shoulder-high, and this, moreover, involves a great strain on the part of the stretcher bearers, particularly in counteracting a tendency to stumble. Furthermore, the *upward pushing* effort required to ease the weight from the shoulders, from time to time, is more fatiguing than the *upward pull* of the handles of a low-slung apparatus.

The author has devised a trench carrier which has the following advantages over the old pattern :

1. It does not require the assistance of an extra man, or extra men, to mount the patient. This avoids the discomfort to the patient of superfluous manipulation and the necessity of conscious effort on his part to maintain the position.
2. It lessens the labor of the stretcher bearers.
3. The carrier is at no point wider than the patient.
4. The direction of the weight of transport is *directly downwards*.

The apparatus consists of a canvas sling, hung with a semi-circular dip, attached to a steel tube, the straight ends of which are so jointed that they can drop through a quarter of a circle to the vertical position, while that portion passing over the sling takes

the form of a semi-circle, describing thus with the sling an approximate circle. The sling is attached to one end by means of a horizontal curved cross-bar, and to the other end by a hook. (The length of the canvas must be such that the centre of gravity of the patient will fall below the horizontal level of the handles.) At this point a short cross-bar with upturned ends is fixed, with a similar one placed a little beyond the joint of the straight end. These cross-bars serve as supports for the patient's legs. At the base of the semi-circular bar spanning the sling are three hooks, to any of which the extremity of the sling can be attached if a change of position be desired.

When the bearers come to a corner, or wish to pause for a rest, they drop the jointed extremities and hold by the short length which remains. At many of the less acute corners, it is only necessary to lower one of the ends. The advantage of this single-handled carrier is that the disposition thereof is not affected by the sudden removal of one hand; incidentally, it does not twist laterally to unsafe angles when this occurs, as would the old two-handled plane surface carrier.

The downward weight of support is borne by a strap passed round the opposite shoulder — an obvious advantage compared to the wasted effort caused by the strain on the back of the neck by the ordinary stretcher sling.

From the medical point of view, it may be stated that flexion is by no means uncomfortable for the patient, provided he is *secure*, and is not required to make any effort to remain so.

An improved pattern of the ordinary stretcher for use in communication trenches could be made by diminishing the width of one end, and substituting the two handles at that end by a single central one; with this it would be necessary to tie a bandage or puttee around the patient's feet. This alteration would materially assist negotiation of curves.

A jointed toboggan on three rollers, drawn by a short length of rope, is a suggested device for removing patients from No Man's Land without the necessity of stretcher bearers standing bolt upright.

The writer has also used a device for the recumbent patient somewhat in imitation of the steel tube carrier, made of wood. It is suggested that if improved by diminishing the width of the front end, and substituting a single hinged central handle as suggested above for the ordinary carrier, it would serve a good purpose in spite of the fact that a few corners might be found round which it would not pass

Finally, no one device can be capable of meeting every contingency, but the writer considers that this pattern seems to cover more than any other he has tried.

Surgery of the Head. By CHARLES H. FRAZIER. *Progressive Medicine*, March 1, 1918.

Gunshot Wounds of the Head. All head injuries should be carried from the place where they fell to the place where they can be operated upon as rapidly as compatible with the military necessities of the moment.

All head injuries should be explored immediately upon arrival at the designated hospital, regardless of the hour of arrival, of the date and hour of the wound, of the statement on the diagnosis tag, of the clean appearance of the dressing, or of the patient's state of fatigue.

Head injuries should, whenever possible, be transported directly from the battlefield to the evacuation hospital, because :

a) Once operated upon they should not be subjected to further transportation until they are convalescent.

b) Because field ambulances and field hospitals are within range of artillery fire and the noise and concussion are very detrimental to such cases.

Systematic intervention in all penetrating wounds is necessary; only a very few cases make an exception to this rule.

The operation should be performed immediately.

It is advisable to examine the nervous system in every case, avoiding tiring the patient.

The radiological examination should in almost all cases precede the operation to obtain as exact a location as possible of the intracerebral projectile.

The osseous defect should be reduced to a minimum: it should be a few millimeters larger than the meningeal lesion.

All bony fragments projected into the brain should be extracted; the epidural space should also be carefully explored.

Deep-lying projectiles should be extracted early whenever their removal is possible without producing greater damage.

In cases of vast wounds with tearing of brain substance, drainage with gauze is extremely useful.

In all cases in which the wound is probably infected, the suture of the skin of the scalp should not be completely carried out.

The suture of the dura mater should be reduced to a minimum.

In lesions of the large sinuses, when hemorrhage cannot be

stopped with simply tamponing, it is best to use a suture, limiting the use of the forcipressure to cases of extreme gravity and urgency.

Bandaging should be renewed as rarely as possible.

The rules of the most scrupulous asepsis should be followed in bandaging as well as in the operation.

The small cerebral hernias are reduced with compressive treatment; in large hernia all attempts at reduction should be omitted.

If the existence of a cerebral abscess has been diagnosed, it should at once be opened and drained.

The nursing of the patient should be most careful.

The patient should not be removed before a complete surgical cure.

The greater part of the deaths was due to the lesion itself; less frequently to meningo-encephalitis, suppurating cerebral hernia, and cerebral abscess.

Technic for Removal of Bullets. An unusual location of a bullet, which had lodged between the atlas and the base of the skull, gave Kanavel the opportunity to apply a novel technic for its removal through the mouth.

With the patient under anesthesîa and the head thrown back, rubber tubes were introduced through the nostrils and the two ends brought out through the mouth, so that the soft palate could be held out of the way and the vault of the pharynx exposed. An incision about one-half inch in length was made to the right of the median line just behind and parallel to the posterior pillar on the right side and on a line with the atlas.

The muscular and connective tissues were separated by blunt dissection down to the bone and the tract of the bullet identified, but the bullet could not be seen. A silver wire was then introduced to the depth of the wound, with the aid of a fluoroscope, and the relation of the wire to the bullet was seen.

Resuming the operation it was found that the bullet had lodged in a pocket behind the upper part of the atlas, so that at times it lay between the atlas and the base of the skull and again in a pocket to the inner side of the atlas. Finally it was found at a depth of three and a half inches from the surface of the mucous membrane, and, after removal, the wound was painted with tincture of iodine and tamponed with gauze.

The technic of removing intrahemispherical foreign bodies differs entirely from that of removing a bullet within the hemispheres. In the first place, from the standpoint of localization, the cerebral

falx serves as a very convenient and reliable guide, and, by following the falx, injury to the brain is avoided. The skull is opened with an osteoplastic flap, or with a trephine, 1 or 2 centimeters to one side of the median line to avoid the superior longitudinal sinus, either at the vertex, or 3 centimeters more posteriorly. A crucial incision is made in the dura and, with a flat retractor, the internal surface of the hemisphere is exposed. The missile is then searched for with the finger and removed with forceps.

Some Features of Gunshot Wounds of the Chest. By J. F. Dobson, Lieutenant-Colonel, R. A. M. C. Abs. from the *British Medical Journal*, June 15, 1918.

The chief cause of failure in operations on the chest is sepsis. The writer describes two cases in which chest wounds were excised and sutured, and the patients evacuated. In both, serious infection, necessitating opening and drainage, set in. The writer, therefore, considers it dangerous to evacuate a case in which the chest has been primarily sutured, until the possibility of infection is past. According to Gask and Wilkinson[1], such infection after closure occurs in about 28 per cent. of cases. Anderson[2] reports 24 per cent., and Roberts and Graig[3] 40 per cent., of such infection.

Although early and thorough operative treatment with closure of the chest is the best preventive of sepsis, there are many cases in which sepsis cannot be avoided, as, for instance, when it takes place in the lung itself. It is doubtful that treatment by drainage from the start would improve the results in these cases. Many succumb to sepsis in spite of large opening and free drainage. An infected chest wound must be treated, like all others, by washing the whole infected area at regular intervals with an antiseptic fluid, and by efficient drainage.

If symptoms indicating infection occur, the chest should be opened and explored and the hemothorax tested. Radiography is of much assistance in determining the amount of fluid, but it should not be allowed to delay operation. Clinical symptoms of infection should be regarded as sufficient indication for operation.

The operation may be performed in one of two ways :

1. Resection of a short section of a rib and the insertion of a drainage tube under local anesthesia; or

1. *Brit. Med. Jour.* Dec. 15, 1917.
2. *Brit. Med. Jour.* Nov. 3, 1917.
3. *Brit. Med. Jour.* Nov. 3, 1917.

2. Thoracotomy under general or local anesthesia. Resection of a considerable length of rib (4 1/2 to 5 inches) preferably the 8th. Insertion of a spreader (Tuffier's *écarteur* is very satisfactory). Removal of clots, fluid, foreign bodies, bone fragments, etc., and repair of damage to lung and diaphragm.

Although the first operative treatment suffices in a majority of cases, drainage alone is not sufficient when sepsis is well established. A further disadvantage of the first procedure is that it does not permit of thorough exploration and cleansing.

Drainage should be supplemented by the instillation of an antiseptic. This may be accomplished by :

1. Irrigation of the cavity once or twice a day through a drainage tube. This method is effective only for a small cavity.

2. Irrigation every two hours through Carrel tubes supported on wires and inserted into the cavity in all directions through the drainage aperture. (Tuffier's method.)

3. Filling of the cavity with Dakin's solution every four hours through the drainage tube. The fluid should be siphoned off at the end of two hours.

4. Irrigation through a special silver cannula[1]. This is sutured into the third or fourth space and a drainage tube is sutured into the original incision. A Carrel ampoule is then attached by a connecting tube to the cannula. Thus the cavity is irrigated every two hours.

The author points out many advantages to be derived from this last method of procedure. The results from it have been striking. The patient's condition has improved rapidly and the lung has expanded. If the cannula has been removed because of pain from the lung expansion, an ordinary Carrel tube may replace it.

Various methods of treating chronic empyema are discussed. The author objects to methods which, like Estlander's, Schnede's, and Wilms's, merely fill the cavity and do not permit of the expansion of the lung. Decortication of the lung after an osteoplastic resection, by which procedure the thickened visceral pleura is stripped from the surface of the lung exposed in the cavity, sometimes induces expansion, but is dangerous and not to be recommended.

In two forms of empyema, in which the collapse of the lung is not complete, the lung is prevented from expanding by a fibrinous growth of membrane which attaches more or less rigidly the pleural membrane covering of the lung to the lining of the chest wall.

1. *Brit. Med. Jour.*, Feb. 2, 1918, for description of the cannula by the author.

This attachment is especially strong at the two points where the lung remains in contact with the chest wall (See Fig. A and F). If this membrane has already formed, as is the case after any delay in recognizing and draining the empyema, it effectively prevents complete lung expansion. If these adhesions can be separated, expansion is assured. The operation is not difficult and there is little danger from hemorrhage.

When, however, the collapse of the lung is complete, the cavity can be closed only by an extensive osteoplastic operation.

A Study of a Series of Cases of Injury to the Chest, Seen at the Base. By C. DEAN, *The Quartely Journal of Medicine*, January, 1918.

The writer gives a detailed account of cases of injury to the chest, and arrives at the following conclusions :

1. If a hemothorax has been produced by a bullet wound, it is very improbable that sepsis will occur. Of those produced by shell wounds about half are infected.

2. Many patients with penetrating wounds, both bullet and shell, when seen at the end of a week, shown no signs of lung injury.

3. Pain and, more important, tenderness and hyperaesthesia of the skin in a case of hemothorax should make one strongly suspect that there is infection.

5. Cyanosis and dyspnea generally mean that there is infection of a hemothorax unless the latter is a very large one, but of all the early symptoms of infection, sleeplessness is perhaps the most valuable.

5. The loss of weight occasioned by a septic hemothorax is a striking feature and in excess of, and more rapid than, that produced by sepsis in other situations.

6. Lobar pneumonia complicating a hemothorax is not as serious as might have been expected.

7. Contrary to expectation, abscess of the lung is a rarity.

8. Bronchial breathing is often heard over a hemothorax. The most valuable signs for the differential diagnosis between a hemothorax and pneumonia are the degree of impairment of the percussio n note and the presence or absence of rales.

9. The X-rays are essential for the diagnosis and treatment of hemothorax.

10. After shock has subsided, pallor is not seen in patients suffering from even a large hemothorax if it is sterile.

11. A hemothorax, if of moderate size, should be aspirated after six or seven days, and no harm will result if this is done as a routine for every hemothorax.

12. Clotting to a degree sufficient to prevent efficient aspiration of a hemothorax is rare.

13. Secondary hemorrhages after the first few days do not occur in sterile cases.

14. The position of the diaphragm is often abnormally high in cases of hemothorax, and this fact is to be remembered when aspiration or resection is performed.

15. It is rare for organisms to be found by culture in a hemothorax fluid if they cannot be seen in a stained film prepared from the fluid.

16. Resection is not indicated for every case of infected hemothorax. The bacteriology, general condition of the patient, and the size of the hemothorax must all be taken into account in coming to a conclusion as to whether resection or aspiration should be done.

17. The advantages of a preliminary aspiration, when it is certain that resection will be necessary, are overbalanced by the loss of valuable time entailed by this procedure.

18. When a hemothorax is infected solely by pneumococci, a better result will probably be obtained by aspiration than by resection.

19. The Carrel-Dakin method applied to the treatment of septic hemothorax after resection will prove to be of the very highest importance and value, since by its means secondary infection, which is one of the chief dangers of this class of case, can be almost completely eliminated.

20. For resection a light chloroform anesthesia is generally safer than, and preferable to, a local one.

21. Cases where there is a gaping wound into the pleural cavity carry a very bad prognosis.

22. The virulence of the infection, rather than the time before drainage is established, determines the density of the walls of the empyema cavity and the amount of collapse of the lung in cases of septic hemothorax.

23. It is of great importance to get the patients, for whom resection has been done, out of bed for a few hours at the earliest possible date, when the general condition and the pulse-rate allows.

24. The displacement of the mediastinum may take a considerable time to right itself, even after operation, so that care must be

taken not to mistake the abnormal position of the apex beat as evidence of a dilated heart.

25. Bronchial breathing, rales, and an impaired resonance at the left base may be the only signs of even a large pericardial effusion.

26. The rarity of subdiaphragmatic abscess is somewhat surprising.

27. By far the commonest cause of death in cases of chest wound which reach the Base is sepsis occurring in a hemothorax.

28. A lower mortality in infected cases is to be gained by earlier diagnosis and more efficient treatment of sepsis, rather than by early prophylactic operations undertaken as a routine.

4. Statistics as to mortality are of little value, since they vary enormously according to the time when the cases are under treatment. In the French army, in the Crimean War, the mortality was said to have been 90 per cent. (10). In the Spanish-American War it was 27.5, and in the South African War 14 per cent.

The number of deaths from all causes in this series of 129 was 11, i. e., 8.5 per cent. Of the fatal cases, death was due to septic hemothorax in 7, to perforation of the first part of the aorta in 1, to pneumococcal pneumonia in 1, and to abdominal complications in 2 cases.

The mortality for infected hemothorax was 21.9 per cent.

In Rose Bradford and Elliott's (2) series of 450 cases the total death-rate was 10 per cent., of which 70 per cent. was due to septic hemothorax. In the 117 cases of the latter there were 36 deaths due to sepsis.

Partial Resection of the Lung Because of Abcess. Raymond Grégoire. *Bulletin de la Société de Chirurgie*, August 6, 1918.

Undoubtedly the great number of chest wounds treated during the war have given rise to a bolder technic in the surgery of the lung.

Observations on partial resection are rare enough, the author believes, to warrant the publication of notes on the following case:

A colonial soldier from Algeria entered the hospital of the 18th region on the 14th of June 1918, with a diagnosis of slight dyspnea. The electro-vibrator and radiography revealed a German bullet on the right axillary line toward the seventh intercostal space. All the lower half of the hemothorax was darkly discolored owing to thoracic extravasion. The eighth rib was resected in a wide excision, and a fairly important sero-hematic effusion of the pleura was

found and removed. At the lower extremity of the lobe, there was a large tumefaction. The tumor was dark red with yellowish patches, the lung being only a little darker that usual. A puncture showed the tumor to be an abcess grown around the projectile. The whole abcess zone was resected in the parenchyma; the blood was black, and the abcess yielded a quantity of pus. The point of the bullet could then be seen to have perforated the wall of the cavity. There was, however, moderate bleeding.

Courcoux had already found, when sectioning the edge of the lung in a dog, that it bled very little. Suture was made afterwards without fear of hemorrhage. The lung was replaced in its cavity, and the wall also sutured.

On the 19th of June the patient was slightly oppressed. A pronounced pneumothorax was observed with a small quantity of liquid in the pleura. A puncture was made evacuating the air and the liquid. A month afterward the patient was completely cured.

This observation proves the necessity of extracting projectiles lodged in the lung.

Undeniably, immediate intervention presents great dangers, but when the traumatic lesions are healed the extirpation of the projectile is imperative. Besides functional troubles, projectiles may also cause ulceration or even very much delayed abcesses. Before intrapulmonary abcesses the most simple technic is the suture of the lung to the parietal pleural, then the opening of the collection and its draining from without. Gregoire, however, decided to resect at the same time the abcess and the pulmonary parenchym, which perhaps may be contamined also. He does not recommend this as a regular form of treatment for pulmonary abcesses, but his observation is of particular interest because the resection involved a rather large portion of the lung. As it happened, the abcess occupied a part of the lung where resection was possible, but such is not always the case with the anatomy of the organ.

Danger of hemorrhage is very much lessened since after pneumothorax, or effusion, there is a considerable diminution of the circulation. The most difficult attainment is to avoid the infiltration of air in the pleural cavity. Grégoire, indeed, thinks that pneumothorax under tension owes its origin to smaller bronchi having been sectioned and left gaping. Air, in the present case, had filtered into the pleural cavity either during coughing or breathing, and the pressure increased progressively since there was no outlet for the air to escape.

It would be interesting to know how the space left by the resected lung is filled. So far, radioscopy has not permitted to say :

perhaps the diaphragm rises slightly. At any rate, the fact remains that the patient did not feel any discomfort.

On the Extraction of Intrapulmonary Projectiles. By G. MARION, *Bulletin de la Société de Chirurgie*, August 6, 1918.

Out of 158 patients, Marion treated only 2 cases which he could not operate, and out of the 156 cases operated there was only 1 death. In 7 of these Marion made two attempts to extract the projectile, and in 12 cases there was purulent pleurisy, which, however, was easily cured after incision. His statistics are remarkably good and he attributes them entirely to his special technic. He objects to Petit de la Villéon's technic, which, he admits, has given excellent results, on the ground that it requires operating in the dark.

Duval's method has not given Marion as good results as his own, perhaps for lack of familiarity with it.

Le Fort's technic seems to him to require too great virtuosity, and to yield no results superior to his own. Marion's process is to locate the projectile exactly, and then to resect a rib giving access to it. He fixes the lung to the wall with three or four stitches of catgut, and then, guided by the localizing compass, he makes an incision through the pleural wall between the stitches. When the wall is opened, the projectile is found and removed by the fingers. Only seven times out of 156 cases did he fail to obtain the projectile the first time.

Posterior Thoraco-Pneumotomia, Radio-Operatory, for the Extraction of Projectiles Lodged in the Hilum of the Lungs. By PETIT DE LA VILLÉON. *Bulletin de la Société de Chirurgie*, June 4, 1918. Presented by J. L. FAURE.

Dr. Petit de la Villéon presented sometime ago five or six wounded, perfectly cured, on whom he had operated four projectiles in the hilum. He had, at that time, operated on sixteen men with 100 per cent. of success.

These are very fine results, considering all the gravity of projectiles in the hilum, and Faure thinks it would be profitable to make known the study of the anatomical research which Petit de la Villéon went through in order to arrive at such results.

Petit de la Villéon defines the dangerous hilum region of the lungs as follows : anomo-vertebral trapezium limited by the spine,

by the spinal edge of the scapula in its lower half, and by the fifth and eighth rib. His more detailed researches lead him to say that the most direct trans-pulmonary way of access to the hilum is the posterior. This method permits, instead of cutting deeply into the flesh, the resection of a rib, either the sixth, seventh or eighth, as the case may be. The scapula is not resected, only slightly deplaced at its lower angle by making the patient put his hand over his head. There is, therefore, much less danger of pleural infection. Petit de la Villéon calls attention to the fact that, if the projectile is located and seized with the X-ray light, the actual extraction is performed in daylight where the doctor can cope with any possible hemorrhage or other secondary accidents, and do the plugging in absolute safety. This plugging is removed forty-eight hours later, and too much care cannot be taken then to avoid hemorrhage. There was not a single one out of the sixteen cases referred to above.

J. L. Faure is convinced that the radioscopic is the best method of extraction. For surface projectiles the electro-vibrator is an admirable apparatus if the projectile is magnetic. For many projectiles localizing compasses give splendid results, but of course radioscopy gives the most certain results. It has its defects, the greatest of which is not the danger incurred by the surgeon, but rather the necessity of a very special and complicated equipment, and also the re-education of the eye, sometimes impossible for older men. Mauclaire even thinks it is not unimportant to bring up before doctors the fact that they must be patient in all radioscopic examinations, for it takes quite ten minutes for the retina to adapt itself and for the projectile to be seen at all.

Le Fort, who has often presented men operated on for intrathoracic projectiles, prefers the anterior extraction: that is to say, large transpleural extirpation. If radioscopy is not possible, undoubtedly this method is the safest, but it means, among other dangers, cutting deeply into the tissues. Lefort himself recognizes that the four unsuccessful cases he had out of a series of sixty operations were precisely those operated on the pulmonary pedicule. That is why the author thinks that if radioscopy were used, as it should be when circumstances allow, the posterior way is by far preferable.

Robert Didier advocates another method of resection which bears on costo-transversary articulation instead of making a gap by resecting one of the ribs. But the author thinks this little gap is not so injurious since it does not provoke abundant bleeding, is not deep nor difficult, and does not impair the strength of the thoracic framework.

J. L. Faure suggests that projectiles situated in front of the hilum should be reached by the chest, while those situated in the posterior region should be reached by the back so as to meet as few vessels as possible.

Immediate Operations for Wounds of the Heart from Projectiles of War. H. Contantine and M. Vigot. *Revue de Chirurgie,* September-October, 1917.

Emergency operations on the heart shortly after injury are very uncommon. Every case of injury to the chest should be examined by X-ray for immobility of the cardiac shadow which is characteristic of penetrating wounds of the heart. This report contains four operated cases with two deaths, operations being within 24 hours.

Case I. Suture of wound of posterior aspect of left ventricle after luxating heart. Organ steadied with left hand and three sutures passed. Ether, anesthesia, cure.

Case II. Suture of penetrating wound of left auricle. Cure.

Case III. Combined abdominal cardiac injury. Wretched condition prevented operation. Death. Autopsy showed a small projectile in apex of heart.

Case IV. Complicating injuries of arm and of thigh, hemothorax, with symptomless injury to heart. Shell fragment traversed left ventricle wall apex and lodged in wall of right ventricle. Death.

The author recommends making a trap-door incision of chest wall with hinge to the left, including three costal cartilages and sternum, so as to get a satisfactory exposure.

Gunshot Wounds of the Knee-Joint. Major Richard Charles, R.A.M.C. *British Medical Journal,* June 29, 1918.

The experience of the author proves conclusively the correctness of the advice given in 1915 by Colonel Gray that conservatism in gunshot wounds of the knee should be the rule. All such injuries should be operated upon within the first 24 hours after a preliminary X-ray which determines the position of a foreign body as well as the extent of bone injury. The operation should be done in a bloodless field (Esmarch bandage). After sterilizing the skin (shaved, and washed with spirit) with 5 o/o picric acid, the wounds are packed with gauze to prevent leakage of infected fluid unto the skin.

The entire tract should be removed intact down to the joint cavity without permitting instruments to touch this infected area. After making an elliptical skin incision about the wound, the skin is undermined and its edges protected by oiled silk. Then an incision is carried on one side down through all layers into the joint cavity to permit a view of the deep end of the tract. With these landmarks established, the tissues enclosing the whole tract are excised in one piece, and, as both ends of the tract are in view, a minimal loss of fibrous tissue takes place.

When the joint is investigated, instruments and gloves are changed. The original opening is enlarged to allow thorough examination. At times it may be necessary to cut across the patella ligament to get adequate exposure. If the missile is lodged in the joint cavity, it is removed, the joint irrigated and closed in layers, with the object of getting first intention.

Experience has shown that the protective mechanism of the knee joint versus infection is much better than was thought; in fact it resists infection better than the soft parts, and, therefore, to avoid infection from without should be regularly shut off from these by suturing the joint. If the missile is impacted in bone, its site should be isolated by saline gauze and it should be chiselled out with adjacent bone; a clean-cut incision being made with osteotome and hammer. The joint is then irrigated and closed. Grooved bone injuries, small comminuted fractures, chipping of the bone, are carefully removed or chiselled away.

In mid line of joint these principles are difficult to apply. Severe lesions in this region often penetrate further into the bone than examination reveals, or the surgeon can excise. In these one may be compelled to resect. However, by reflecting patella and employing Carrel Dakin from the start, one can often save the joint. When the bone lesion is small and the conditions otherwise favorable, the infected area may be curetted away and the joint closed after thorough irrigation.

Another type of wound necessitating departure from the principle of en bloc excision is that with chipping or comminution of the tibial head. Here excision must be practiced in stages. It is necessary to excise first skin wounds and tracts in soft tissues, then reflect patella and excise infected ligamentous structures—usually also the meniscus, and finally, by a vertical incision over the lateral aspect of the head of the tibia, fully expose and chisel away the damaged bone.

In favorable cases the wound is completely closed; otherwise it is dressed with Bipp and packed with gauze, the end of the gauze

being brought out through the partly closed wound. When the patella is fractured, the comminution is liable to be so great as to call for complete removal together with neighboring tissues. Precaution must be taken against cutting away any serious membranes or ligaments beyond the margin of necessity. In bringing the parts together it will often be necessary to lengthen the quadriceps tendon. Less serious patella injuries can be excised with metacarpal saw.

Gaps in the synovial membrane may be repaired by bringing down the membrane from the suprapatella bursa and suturing it in place.

In 50 consecutive cases there were three deaths (sepsis). In 20 cases reported in detail in this paper there was, as far as the author knows, but one secondary amputation. The article does not speak of functional results.

ORTHOPEDICS

Kineplastic Amputation. By V. Putti, Director of the Rizzoli Institute at Bologna. Abstract of an address before the Royal Society of Medicine. *The Lancet*, June 8, 1918.

Professor Putti expressed his great confidence in the beneficial results to be obtained by the methods of kinematization based on the theories of plastic-motor (motor flaps originally advocated by Professor Giuliano Vanghetti during the second Italian expedition into Abyssinia in 1896). Germany and Austria have given the theory and its practical application a very careful consideration, but hardly a mention of it is made in the publications of France, England and America. Before the present war even in Italy kineplastic amputations did not exceed twenty.

The terms *kinematic plastics* or *kineplastics* are given by Dr. Vanghetti to any bloodless or operative plastics that tend to economize, restore, or substitute muscular masses which can be employed towards imparting direct and voluntary movement to an artificial limb.

Every moving entity obtained kineplastically is called *plastic-motor* (*motor-flaps*). This term denotes the living part of the apparatus which moves the artificial limb.

The principle on which the creation of such motor flaps is

based is that the tendon and muscle, provided they have the necessary physiological protection (skin, vessels, nerves, etc.) can generally be used for the kinematic prothesis, provided also that they admit of the formation of an artificial point of attachment. Kinematization can be effected or prepared for at the time of the amputation. It can also be accomplished on stumps that have already healed.

Motor flaps may vary as to their number, position, shape, and function. The most elementary and the most commonly used are the *clava* and *ansa* motors, and those obtained by canalizing, or tunnellizing, of the muscular masses. In a single prothesis there may be one or more such motors, acting together or separately, and even opposite movements. The upper limb is the one most frequently kinematized.

Technic. For the purpose of kinematization more bone and soft tissue must be spared at the time of operation than has hitherto been thought necessary. Even if the pressure of work is too great to permit the completion of kinematic surgery, at least the operator may amputate in a manner to make possible later kineplastic treatment. This should be done so as not to interfere with the ordinary dressing of the wound. When there is no more inflammation or fear of complications, the motor flaps may be prepared.

The *motor flap* should be planned to withstand a firm, resisting, and painless grip, and also a traction that may attain a high degree. It must also be provided with a sufficient amount of functional muscular tissue. To this end the motors must be covered with skin in perfect condition, well nourished and provided with a normal degree of sensibility. In shape and dimensions they must be large enough to permit the attaching of the necessary hooks, wings, and rods. Muscular masses should be chosen which will produce broad, strong, and independent contractions. The tendon is best suited to the transmission of muscular traction and should, when possible, be employed in forming motor flaps.

If tendons are not available, muscular bundles may be included in the motor flaps, or the muscular masses may be tunnellized in order to obtain extra-terminal motors; that is, a means of purchase outside of the stump itself. The antagonistic powers necessary to all active movement must be provided either from the stump itself, or by means of elastic resistance in the artificial limb. To provide the motor with all requisites the various forms of grafting known to plastic surgery may be employed.

By kinematization of the quadriceps, the stump may be made to

control the extension of the knee and to restrain flexion, thus overcoming one of the most difficult problems of prothesis.

By kinematization, even the stumps which formerly were considered useless may be made serviceable, as, for instance, the carpal stumps, short forearm stumps, and disarticulation stumps. If, in shoulder disarticulation, the deltoid and pectoralis major may be spared and covered with skin, and a point of attachment provided, a considerable functional result is possible. Points of attachment provided in short forearm and leg stumps may be created to correspond to the insertion of the biceps and patella tendons.

When a point of attachment is not easily available at the end of the stump, one may be reached by canalization through the muscle mass. The canal, if properly coated with skin, may tolerate the metallic rod which conveys the muscular activity to the artificial limb.

A flap to be of practical value must have a power of 10 kilogramme-centimeters and must shorten not less than one inch. Power of as much as 100 kilogramme-centimeters has been developed. The flap easily supports the necessary constriction of ring and screw, which attaches the communicating mechanism without pain or impairment of blood supply. The author in the case of one thigh stump obtained a contraction of 2-1/5 inches and strength to lift 44 pounds.

The speaker exhibited various casts showing the types of motor flaps, which he had himself made, and kinematograph representations of the functional value of this type of prothesis. No supplementary shoulder or hip movement is required as in the older forms of prothesis. The physician and mechanic must act in close co-operation to produce a limb perfectly adapted to the nature of the stump. When this is done, the results obtained in practice amply justify all the claims made in behalf of this method.

Kineplastic Amputation. By Dr. VINCENT GAUDEANS of New York. Abs. from *Annals of Surgery*, April 1918.

The writer has gone into the literature carefully and furnishes a complete bibliography of the subject of kineplastic amputations. He thinks that Vanghetti's method is especially adapted to the upper limb and can be used in every case by forming " knobs " or " loops " at the end of the stump. These stumps are to be covered with healthy skin and form a basis for later adaptation of apparatus, or, as he calls them, " plastic motor ". The loop is made by the natural or artificial union of muscles and tendons forming a space

through which a ring can be adapted to transmit contraction outside.

The knob is an enlargement of tendons or muscles endings, formed by the surgeons either twisting a number of tendons, or by using a bone eminence where the tendon is attached.

The after-care is extremely important in order to maintain proper functioning of muscles.

Secondary kineplastic operation is desirable and should be performed in institutions where the artificial limb may be fitted at the same time.

1. The kineplastic amputation (Vanghetti) is such a modification of the operative technic that it makes possible the transmission of voluntary movements to the prothesis, thus realizing a true vitalization of the amputated members.

2. This method should be applied whenever possible, especially in the upper limb.

3. In performing amputation of the upper limb, one should always have in mind the possibility of a future kineplastic transformation of the stump.

4. Secondary kineplastic operation should be favored and possibly performed in institutions where, at the same time, the artifitial member could be constructed and fitted.

The Careful Treatment of Stumps. By P. Desfosses. Trans. and Abs. from *La Presse Médicale*, June 10, 1918.

The author insists that the orthopedic care of a stump should be continuous from the time of amputation until the patient enters the re-educational school.

During the period of healing, the stump should be so placed that in case ankylosis occurs it may still be utilized. To prevent ankylosis the position of the stump should be frequently changed during the operation, and later the stump should often be exercised.

The healing should not be left to itself, but the surgeon should do everything possible to bring the edges of the wound together. The method employed to this end varies with the needs of the case.

If the healing process is going well, the edges may be brought together with bands of adhesive plaster.

If the flaps are too far apart, each flap may be provided with rows of hooks. Elastic lacings are then applied to draw the edges together.

If there is recession of the soft parts, and especially of the skin, an adhesive bracelet supplied with hooks or some means of attach

ing an extension apparatus is applied, and the skin is thus held by a steady tension throughout the healing period.

It is a mistake to keep the stump in repose during healing, or to confine walking to crutches. On the contrary, the stump should be utilized at the earliest opportunity, as it is to be used permanently. For this purpose temporary means of prothesis are devised, so adjusted as to relieve the wound of all strain. These appliances, suspended from the shoulder by straps, enable the patient to practise walking with the help of only a cane.

The author reviews the many accidents which may prevent healing, especially suppuration, due to foreign bodies, sequestra, or osteomyelitis, both terminal and lateral. Such conditions present much difficulty in operation. The stump development may also be complicated by abnormal but healthy bone growth, which may not be troublesome. It may often be neglected entirely.

Even if healing has been completely successful, the stump may still be useless. Painful stumps may be caused by too much soft tissues at the end of the bone. If everything appears normal, the pain must be attributed to nerve ends near the surface. If the pain is felt in the scar itself, Tuffier considers resection of the scar sufficient to reveal the nerve disorder. In case there is a general sensitiveness of the stump, Tuffier practises a full flap incision at the level of the maximum sensitiveness, with resection of the nerve.

When the healing has been completed in perfect condition, considerable care is still necessary before the stump is ready for an artificial limb, especially if of the American type. The skin must be rendered supple by bathing, massage and ointments. Massage and electrical treatment help to impart tone to the muscles, and simple appliances may be devised to remedy stiffness of the joints and mild cases of ankylosis. These must be supplemented by massage and by passive and active movements.

The author describes with much detail the temporary appliances used at La Panne by the Belgian surgeons to secure the necessary compression of the soft parts, and to start the reduction of the limb. These may be adjusted to follow the evolution of the stump, and so act as a supplement to surgical treatment as well as a means of early reduction. They are roughly and cheaply constructed with plastered bands, iron hinges, metal setting, wooden crutches, and leather straps and bands.

The Treatment of Diaphyseal Fractures. By. J. Delmas. *La Presse Médicale*, June 20, 1918.

The author does not agree with Leriche that fractures in a bullet wound with regular orifices of entry and exit may be regarded as closed fractures, and treated without primary operation. He has found such wounds liable to infection even when the orifices are punctiform, and he considers primary operation essential. There should be generous excision, removal of bone fragments or foreign bodies, and primary suture. Such wounds are often as dangerous as those due to shell fragments.

Comparing a series of fractures with small orifices which he treated without operation, and another similar series treated by thorough excision and ablation, the author came to the conclusion that although the non-operated cases caused less inconvenience and at first appeared to do better than those given thorough surgical treatment, they were in a much less satisfactory condition at the end of twenty-five days. In general, the bone was poorly consolidated, the soft parts contained detached bone fragments which might later prove to be foci of infection, and not infrequently there was actually a fistulous discharge from the exit orifice.

The writer, therefore, would vary the generally accepted principle of abstention in cases of fracture with punctiform orifices as follows :

1. If only the entry orifice is punctiform, radical surgical treatment is indicated.

2. If both entry and exit orifices are punctiform, but X-ray examination discloses a comminutive fracture, radical surgical cleansing is indicated.

3. If both orifices are clean and punctiform, and the tract regular and without bone fragments, abstention may be warranted, provided that a careful watch is kept against possible infection from bits of clothing.

Madderized Bone as a Material for Bone Grafts. By Madge DeG. Thurlow and C. C. Macklin, from the Dept. of Anatomy, Johns Hopkins University. Abs. from the *Annal of Surgery*, April 1918.

The animal should be fed madder from birth until the time the bone is removed.

Rats eat the dye stuff readily and therefore were used in this series of experiments. Only transplantation into the flat bones of

the skull was done. Two animals were used: one being killed 55 days after operation, the other 5 months after. In both cases the inserts show very clearly, as they have kept their color and have been welded into place by unstained callus.

It is suggested that it would be possible to observe the rapidity of displacement of a graft in a series of cases by putting an unstained graft into an unstained animal and putting the animal on a madder diet until killed, with the result that all new bone will be colored.

The Use of Small Bone Transplants in Bridging a Bone Defect. By Dr. FREDERIC W. BANCROFT, New York. *Annal of Surgery*, April 1918.

In certain fractures where there is malunion with loss of substance, and where the bone is too small to allow a transplant to be placed satisfactorily, the writer recommends that small fragments of bone (1/2 mm. in size) may be used.

He has experimented with a series of 26 dogs, of which two became infected, two jumped from elevations, and angular union resulted. The remaining 22, gave very satisfactory results. In specimens of one year duration it is difficult to find the bone transplants.

He feels that this procedure offers an adequate method of bridging a bone defect if there is another bone present to act as a splint, and if it is possible to hold the bone in position by external support.

MEDICINE

Report of a Base Laboratory in Mesopotamia for 1916, with Special Reference to Water-Borne Diseases. By Captain T. K. BONEY, R. A. M. C., and Captain L. G. CROSSMAN, R. A. M. C. and Lieutenant (U. L.) C. L. BOULENGER. *Journal of the Royal Army Medical Corps*, April 1918, Vol. XXX, N° 4, page 409.

The authors give a short account of the results obtained at a British General Hospital laboratory, dealing with the diseases prevalent in Mesopotamia among the troops during 1916, including a few brief remarks as to climate and general considerations which

may assist a preliminary understanding of the conditions prevailing there.

The climatic conditions explain the prevalence of malaria and the waterborne diseases among the troops, which diseases show a steady increase from March onward, reaching a maximum in July and August.

Enteric Group Diseases. Of 650 cases diagnosed by all methods during the year, only 21 per cent. were found to be true typhoid, while 65 per cent. were due to Bacillus paratyphosus A.

The first case of paratyphoid B was that of an orderly nursing in the paratyphoid ward. Five cases were diagnosed during April, and an increase occurred in May which reached its maximum in June. In fact more than fifty per cent. of all the cases diagnosed occurred during these two months, blood cultures being positive on several occasions. Since then the incidence of the organism has fallen to four or five cases a month, nearly all of which have come from the Euphrates area. Investigation was carried out under three headings :

(a) Isolation of the organism from the blood.
(b) Isolation of the organism from the stools.
c) Agglutination reactions.

Stool examination was commenced in January and carried on intermittently until the end of April, after which it practically ceased, to be resumed again at the beginning of October. It was chiefly relied upon in those cases seen too late for blood culture — which was made systematically on all possible cases — in which agglutination reactions were likely to be modified by reason of inoculation with T. A. B.

Blood Cultures. Identification was based upon :

1. Reaction and amount of gas, if any, in mannite tube.
2. Character of growth on agar and motility.
3. Reaction to specific serum.

The behavior of the paratyphoids in mannite peptone water differed markedly. As a rule paratyphosus B formed acid and gas vigorously — usually to the extent of about one-third of the Durham tube in twenty-four hours.

A certain number of anomalous organisms were isolated from time to time which could not be referred to any group, although they did not appear likely to be contaminations.

In four cases organisms giving all the sugar reactions of the paratyphoid group were met with, but they did not agglutinate, or only very slightly.

At the beginning of October the percentage of positive results

sent in from other units was very small compared with those done in this hospital. This may be due to bad selection of cases by medical officers, or may also be accounted for by delay in reaching the laboratory. The figures show that 32.6 per cent. of positive were obtained of all cases, whereas taken separately only 15 per cent. of outside cases yielded positive results as against 34.4 per cent. of cases from this hospital.

Stools. Climatic conditions rendered systematic stool plating very difficult, and as a result the method was only followed in a few special cases, reliance being placed on blood culture and Widal tests for the diagnosis of members of the enteric group. Of 108 examinations, B. typhosus was recivered 5 times and B. paratyphosus A eleven times. B. paratyphosus B was never isolated. Direct plating on Mac-Conkey seemed to be the best method for B. paratyphosus B. At the end of twenty-four hours, suspicious colonies were fixed, examined for motility and the sugar reaction tested. The specific serum test was then applied as for organisms isolated from the blood.

Agglutination Tests are the least desirable means of search, but hot-weather difficulties and the required length of stay in hospital for stool or urine examinations rendered recourse thereto necessary. Marked agglutination to A or B has been taken as presumptive evidence of infection by the corresponding organism, even if the T-titre was also high. The possibility of mistaking a true T. infection for an A or a B under these conditions would appear to be remote, since it is generally agreed that T. infection produces, as a rule, little group agglutination for A or B, whereas in A or B infections usually the first noticeable change is a rise in the titre to B. typhosus. It is much more necessary, therefore, to be on guard against diagnosing as a T. infection one which is really due to A. or B.; the true nature of the case becoming apparent later on by the appearance of agglutins for these organisms, generally by the end of the third week. Thus subsequent agglutination tests have necessitated the alteration of a certain number of cases. To warrant a diagnosis of true typhoid in a T. inoculated person, a high or rising titre to T. was required, with none to A and little or none to B.

Stool examination, uncertain as a means of detecting the "Carrier", is even more uncertain as a means of diagnosing large numbers of acute cases during a rush of work. Possibly more energetic hemoculture in all suspected early cases may help in part to solve future difficulties in diagnosis.

Agglutination Technic. The strains used were all reliable ones.

two being brought from France and the third from India. Carbolized agar emulsions were made from subcultures, and retained their agglutinability through the hot weather.

In performing the tests the dilutions were made on a glass plate ruled with grease pencil, then drawn up into lengths of glass tubing, of bore about three millimeters, and incubated for eighteen hours at 37° C when the reading was made, using a 12 lens.

The total number of agglutination tests made during the year was 1,283, and the number of diagnoses made 520, or 40 per cent. Of these 520, enteric fever accounts for 113 = 21 per cent., paratyphoid A for 326 = 62 per cent. and paratyphoid B for 82 = 16 per cent.

Inoculation. Out of figures taken of cases in which the organism was obtained from the blood, — apart from the fact that cases of enteric fever form only 20 per cent. of the total of these, — only 27 per cent. had received inoculation within one and a half years, and 50 per cent. had never been inoculated at all.

With regard to T. A. B., if its value is as great as that of the old typhoid vaccine, it is a little surprising to find the incidence of paratyphosus A so high in men inoculated within six months of the onset. As a matter of fact nearly all these cases occurred within four months of inoculation, and some a good deal less than this.

Cholera. Cholera was first noticed among the troops towards the end of April and the cases were isolated after an examination of the stools. From this time on, there was a steady stream of cases during the hot weather. The outbreak died out by the end of September, having never become alarming. A mortality of about 40 per cent. was recorded.

In forming a positive diagnosis, the following points were taken into consideration :

(1) Naked eye appearance of the stools.

(2) Characters of smear stained with dilute carbolfuchsin.

(3) Culture in peptone water and examination of the top layer for vibrios after eight to ten hours' incubation. The use of Witte peptone was found invaluable in this connection, and frequently gave results when other good peptone, although sugar-free, was negative.

(4) Reaction against specific high-titer serum.

(5) Cholera-red reaction. The hemolytic test was not done in any case.

Of the twenty-eight cases in which a vibrio was isolated, twenty-two were diagnosed on the growth of a vibrio in peptone water, which was morphologically V. cholerae, and which was agglutinat-

ed in the manner specified. In the remaining six no agglutination occurred.

The Dysenteries. Amebic dysentery, whether it is endemic in this country or not, has certainly been responsible for a great deal of sickness during the hot weather, and of even commoner occurrence has been the bacillary form of the disease. Speaking generally of cases with dysenteric symptoms, the maximum of the curve of incidence was reached in August and September, as in the case of enteric group disease, after which it gradually fell again.

It was not possible to examine systematically these cases, but fifty-nine of the stools were plated, all of them containing blood and mucus. B. dysenteriae Flexner was isolated in seven, and B. dysenteriae Shiga in two. Microscopical examination of eighty stools, also containing blood and mucus, showed E. histolytica in eleven.

At the beginning of September it became possible to make a detailed examination of all cases, and 890 cases of intestinal disorder were investigated during the last four months of the year.

These cases fell into two groups :

(1) Cases of acute dysentery.

(2) Cases in which some diarrheal symptoms were present, and in which there may or may not have been a history of a previous acute dysentery.

The method adopted was as follows :

1. Microscopical examination was first made, and the protozoological findings noted.

2. Those containing blood and mucus (i. e., group 1., acute dysentery, and not showing the presence of B. Histolytica) were then plated.

3. Stools containing no blood or mucus were not plated.

This was the general procedure, broken only by a few exceptions.

One hundred and eight cases, or 51.7 per cent., of those submitted to bacteriological examination were proved to be due to infection by B. dysenteriae; and the relative incidence of the two forms of the disease will be : amebic 26 per cent. and bacillary 35 per cent. of the total number of cases examined. Two cases of mixed amebic and bacillary infection were noted : namely, (1) E. histolytica and B. Shiga; and (2) E. histolytica and B. Flexner.

There still remains 39 per cent of acute cases in which the causal agent was not determined.

The Medical Advisory Committee made a report in which it was stated that in the Mesopotamian area, as in other war areas,

bacillary dysentery is the predominant type, and that had the cases investigated been in the main local admissions instead of transfers from up-river, the proportion of bacterially proved bacillary cases would have been still higher.

Protozoölogical Findings in Group I (Acute dysentery) and in Group II (Chronic dysentery and diarrheal conditions). From the month of September, 1916, to the end of that year nearly 1,300 stools were dealt with, representing 890 separate cases, — all British patients. The uniform method of collecting specimens was the use of bed-pans, and smears from the feces were examined in salt solution (warmed to blood temperature when necessary during the winter months) and Weigert's iodine solution, according to the method recommended by Lieutenant-Colonel C. N. Wenyon, R. A. M. C., in his recent publications on the subject. As a result of the examination of these 890 cases, it becomes possible to state that over a quarter (25.9 per cent.) of the acute dysenteries at this hospital, during the last four months of the year, were of amoebic origin.

Malaria. In January benign tertian parasites were found in only 11 cases and subtertian in 1, out of a total of 90 examinations. In May an increase was noticeable, when the number of examinations had risen to about 150 with about sixteen per cent. positive. The monthly average was 200 per month with seventeen per cent. positive. The total number of slides examined was between 2,200 and 2,300 during the year.

Relapsing Fever. Forty-seven cases were diagnosed by finding spirilla in the blood. Only one case terminated fatally, and the epidemic was arrested and terminated by means of strict isolation and disinfective measures.

Jaundice. Blood cultures were done on five cases of jaundice with low pyrexia. All were negative.

Cerebro Spinal Fever. The meningococcus was found in the cerebro-spinal fluid of six cases. It could not be cultivated on blood-smeared agar on any occasion, although once or twice it was present in enormous numbers.

Diagnosis was based upon the polymorphonuclear nature of the exudate and the presence of a Gram-negative diplococcus morphologically resembling the meningococcus, a certain number of which were inside the cells.

Diphtheria. This disease was not infrequent. Of a total of 22 cases which occurred, the majority were those in men in the same regiment, and occurred during August and September. The method of making an inoculation upon the white of a recently

hard-boiled egg, inverted in a urine specimen glass containing a little water to keep it moist, proved to be of considerable practical value, when the heat made difficult the preparation of serum media.

Vaccines. Prophylactic vaccines were made for cholera and enteric group. The cholera vaccine was an unheated agar emulsion killed by one per cent. phenol in which four strains were used in the manufacture, three of which were local, and the fourth Indian. Fifteen thousand doses were issued, the bacillary content being 2,000 million per cubic centimetre.

NEUROLOGY AND PSYCHIATRY

The Physiology of " Functional Paralysis " of " Voluntary " Movement. By T. G. Brown and R. N. Stewart. *The Lancet*, May, 18, 1918.

The authors deal with the functional and psychic paralyses of the limbs, etc., among soldiers who have undergone great stress. A case seen within one hour of onset of functional paralysis and followed for thirty-five days is described in detail. Is was noted that the functional paralysis did not appear immediately after the shock, but a slowly spreading numbness was observed. It was only when the limb was completely numb that the paralysis rather suddenly appeared. The paralysis was at first flaccid — later rigid. Kinesthetic sensations were necessary for the return of " voluntary " power, and when these returned voluntary movements were quickly resumed. At certain joints, however, there was still a failure of appreciation of certain movements.

The authors attempt to define " functional paralysis " and to explain its physiology, in order, as they say, to rationalize the treatment of these cases. They classify the functional disorders into two types, sensory and motor — the former including the functional anesthesias or hyperesthesias, analgesias or hyperalgesias, and the functional abolition or depression of the kinesthectic sensations — functional disturbances of vision, hearing, smell, etc. Likewise there are the functional paralyses of the limbs, aphonia, mutism, etc.

They state categorically that the " functional paralyses " of a limb very often, if not always, are accompanied by functional disturb-

ance of sensation — anesthesia or analgesia, or both; functional aphonia, by anesthesia or hyperesthesia of the mucous membrane of the larynx or pharynx; and mutism is often accompanied by deafness.

The fact that the monkey, in which a limb is desensitized, makes no voluntary use of that limb is exactly comparable, they argue, to the functional paralysis.

The motor mechanism of the cerebral cortex becomes inactive in that part of it which is cut off from the sensory (centripetal nerve impulses of the part of the body which it subserves, but the mechanism itself remains a workable one; i. e., there is probably a sort of " cortical tone " which is kept at a suitable pitch by centripetal impulses which play upon the mechanism.

The authors suggest that the cause of functional paralyses, so-called, is secondary to the anesthesias (in the widest sense of the term) of the parts affected. In support of this they say : " Just as in the monkey functional paralysis of a limb follows the destruction of the afferent nerves of the limb, so, in man, a functional paralysis follows a depression of the sensations of the paralysed part of the body, especially if this depression affects the self-engendered sensations ".

The fact that the functional paralysis tends often to persist after the resolution of the anesthesia is explained by them by the long disuse of the cortical mechanism, making it relatively inexcitable to the impulses which normally play upon it.

Their explanation of the functional gaits and rigidities is as follows : Cortical reactions are characterized by their *phasic* nature (in which the angles between the bones of a joint are constantly changing) occasioned by changing degrees of contraction and relaxation of the muscle of the limb, e. g., the progression in the water of a man swimming. Reactions of the red nucleus are characterized by their *postural* nature (in which there are no movements of the bones relative to each other at the joints, but where the limb is held in a certain posture by a maintained contraction of the muscles), e. g., the slow, difficult progression of a man bearing a heavy weight where the limbs are used as props with a minimum of movement. These facts were proven by the electrical stimulation of the cerebral cortex and of the red nucleus respectively.

Progression is fundamentally a spinal activity — modified in its phasic direction by the activity of the cortical mechanism, and in the postural direction by the red nuclear mechanism. " Functional Paralysis ", fully developed, is probably due to an abnormal exaggeration of the normal manner (postural) of holding and

moving the limbs, which is facilitated by use and conditioned by a a relative difficulty in activating the cerebral (phasic) mechanism. The relative difficulty is, in its turn, conditioned by the failure of certain centripetal sensory impulses to rise above the threshold of the cortical motor mechanism. The " postural " state is a " bad habit ".

Therefore on rational grounds it is best to treat the condition as early as possible and before this abnormal state has appeared or has become fixed or facilitated. The primary condition is the anesthesia, which, when resolved, allows impulses to play upon the cortical mechanism which are ineffective in the state of functional paralysis — the gait, posture, etc.

Exhaustion Pseudo-Paresis; a Fatigue Syndrome Simulating Early Paresis Developing Under Intensive Military Training. By J. Ramsay Hunt. *The Journal of Nervous and Mental Diseases,* March 1918.

The author presents a résumé of the results of special neuropsychiatric examination in one of the large training camps for officers.

Generally speaking, the clinical symptoms were not very marked. General cerebral symptoms or evidence of mental deterioration were so slight as to be practically negligible.

As directly bearing on this subject, emphasis was laid on the occurrence of another group of cases because of the close similarity of the somatic symptoms to those of early paresis. The pupils in all of the cases were unequal and showed a very feeble and sluggish reaction to light. In some of the cases there was so little response as to suggest a true loss of light reaction. The reaction on accommodation was preserved and the sympathetic response was also elicitable.

Clinically, the diagnosis of incipient paresis seemed assured, but the serological examinations of the blood and spinal fluid were entirely negative. There was no increase of globulin or cells and the colloidal gold reaction was negative.

Among the recognized mental symptoms of fatigue were a diminished power of attention, a lack of the ability to concentrate, a slow reaction to mental stimuli, slowness in reasoning, as well as errors and slowness in mathematical calculation.

The suspicious pupillary phenomena observed in these exhaustion cases were possibly dependent upon a disturbance of the sympathetic innervation of the pupil by fatigue or the toxins of fatigue.

Dr. Hunt thought that the formal recognition of a fatigue syndrome simulating early paresis was worthy of earnest consideration, and it was not unlikely that under still greater conditions of stress and strain this group of cases might be the forerunner of more severe types of the exhaustion neuroses and neuropsychoses.

Different Forms of Jacksonian Epilepsy in Injuries of the Sulcus Rolandi. By H. MEIGE and A. BENISTY. *Société de Neurologie de Paris*, Jan. 1918.

Jacksonian epilepsy of classic type is the one observed most of all after injuries of the sulcus rolandi. The most usual form, motor, would be better denominated sensitivo-motor, the sensations being as frequent as the motor disturbances. It is to be noted that Jacksonian phenomena appear in regions affected with motor or sensory disturbances.

Jacksonian crises have almost never been seen without brachial or facial monoplegia in men suffering from genuine cortical paraplegia. This might be only a coincidence. Jacksonian phenomena, however, seem to have been very frequent when a well-marked facial monoplegia has been accompanied by a hemiplegia or a brachial monoplegia. In certain cases, mostly hemiplegia, the affection extends to the arm and even to the inferior limb. Difficulty of speech and constriction of the throat precede the loss of consciousness in cases where the facial monoplegia is very well marked, and when the Jacksonian wave extends from the arm to the face. This seems to be the regular type in cases having a conjugated deviation of the head and eyes after the injury, and when the facial monoplegia and speech disorders have been severe at the onset. Some cases, between the attacks, have convulsion of certain limbs without numbness, electrization, dyspnea, speech disturbances, or loss of consciousness. In the intervals between the crises, certain motor disorders are frequently seen, and their nature seems to be very likely coinitial. They are involuntary movements occurring in attacks during the intervals between the crises, and localized to a limb affected with Jacksonian disturbances. Also tremors of a limb or even of half of the body, occurring a few days before the epileptic crisis, and caused by emotion or fatigue, are sometimes observed. All those intermittent motor disorders can be considered as abortive attacks.

The authors draw attention to another group of accidents which are not so well-known: the continuous movements in head wounds, with or without coinitial phenomena (a. Rapidly oscil-

lating tremors, mostly at the extremity of limbs, increasing with effort or fatigue, and decreasing at rest. b. Rapid clonic movements. c. Choreiform movements: tendons slowly contracted, imitating the slow movements of chorea). The occurrence of those continuous movements in cranium injury naturally suggests a permanent cortical irritation. These are similar to cases in which we see, immediately after the injury and before the onset of the paralysis, limbs which will be paralysed later animated with clonic tremors, accompanied by dyspnea, disorders of speech and loss of consciousness. Similar facts are also noted before or after an ictus. The tremor, or the pre- or post-hemiplegia hemichorea are classical; and we must not be surprised to see them occurring in brain injuries.

Jacksonian paresia is a little known form of Jacksonianism. (*Société Médicale des Hôpitaux*, Oct., '17). The attacks are sudden and transitory, occurring in one limb only (side opposite to injury); in both limbs; or, very seldom, in the limb on the same side. Vaso-motor troubles are constant in all the cases that have been observed. At the moment of the crisis the limbs become cold and asphyxiated. This suggests that the concomitant motor and vasomotor disorders are due to an intercranial sympathetic pertubation. The Jacksonian phenomena were long ago attributed to circulatory disturbances. If the location of the regulating center of circulation in the encephalum is still unknown, the existence of this center appears to be plausible. The Jacksonian equivalent represented by the motor and vasomotor paresia confirms this theory.

Note on Tremors. M. Henry Meige et Mme A. Benisty. *Société de Neurologie de Paris*, Jan. 1918.

The question of tremors is a very difficult one. Very little can be told of their clinical differentiation, pathological anatomy, or pathogeny; the best and every case is a medico-legal problem. Clinical analysis is a means of determining differential characteristics.

The cases of a number of soldiers affected with tremor, — from the service of Prof. Pierre Marie of the Salpêtriere — were presented.

(1) Parkinson's type, (2) Neuropathic tremor, (3) Tremor persisting during sleep, (4) Head tumor, (5) Tremor with camptocormia, (6) Emotional tremor, (7) Constitutional tremor.... In every case, the form, location, and evolution of the tremor must be studied. The form gives useful indications as to its nature. The slow type belongs to the organic form (Parkinsonian); so does the very rapid type (general paralysis, Basedow's, intoxications). The medium

rhythm type is mostly characteristic of neuropathic conditions. This classification is relative; it is much more important to note the regularity or irregularity of the tremor. A tremor always remaining similar to it is most often of organic origin. An irregular type, on the contrary, is neuropathic, emotional, or constitutional.

Location. Very often it is hard to localize the exact seat of the trouble. Where tremor distinctly affects the fingers, it strongly suggests an organic origin (Parkinson's). The proximal types are generally of neuropathic origin, and the distant types are organic ones. The tremors affecting the head only (*hemitremblements*) indicate an organic origin, while those affecting the inferior limbs only are scarce, and generally neuropathic. The synchronism of the oscillations is very important; it is always constant in Parkinson's disease. Tremor must be observed during movement and at rest. The types presenting paroxysms are emotional.

Evolution. — (1) *The progressive type* : extending from one limb or part of it to other limbs on one or both sides (Parkinson's). (2) *Regressive type* : general at first, has tendency to regress to one side or one limb (neuropathic ore motional). (3) *Migratory* : changing from one place to another (neuropathic). It is also very desirable to find out if the tremor persists during sleep. The morphologic subject is Parkinson's; muscles never appear to be relaxed. The speed amplitude and precision of movement (as in writing) are also noted. Palpitation will show the waxy flexibility in Parkinsonian types, and an intermittent (cog wheel) resistance in neuropathic tremors. The examination of reflexes is not easy. Mental examination must be made in every case.

The motor trouble itself is only one of the dystonic symptoms which should be studied as a whole.

PATHOLOGY AND BACTERIOLOGY

A Time-Governed Slide Method for the Agglutination Test on a Series of Microbic Emulsions. By Captain (Local Major) W. Broughton-Alcock, R. A. M. C. (S. R.). *Jour. of the Royal Army Medical Corps*, Vol. XXX., N° 4. Page 424.

This method is one which permits of the simultaneous examination of several standard emulsions of micro-organisms and of the

determination of results in three or four minutes. Army bacteriologists have since 1916 used the method of placing drops of high titer sera diluted 1/100 on a microscope slide and making emulsions in such drops from cultures or colonies of bacteria to be tested; the results being observed by the naked eye. Similarly, unknown sera have been tested in series on slides against known bacteria.

It has also been noted that agglutination is greatly facilitated by rotation of the slide on which the mixture of the serum and emulsion are placed; the contained organisms come into frequent contact with one another and the homogeneity of the serum dilution is maintained by movement.

By the method of testing serum against emulsions of a number of different organisms at the same time, the specific agglutin can not only be detected, but can be distinguished from any co- or hetero-agglutin, which may also be present in the serum, and possible errors of diagnosis by single emulsion examination can thus be avoided.

The writer has endeavored since 1912 to establish the principle that the agglutin action can be measured by the time taken for agglutination to appear in fixed dilutions of serum.

When agglutination tests are to be carried out at intervals during the progress of a case and the results compared in time measurements, the serum requires to be so far diluted that agglutination will not be instantaneous in order that a measurement may be made of the time at which agglutination appears. An increase or decrease in the agglutin content of a serum can be detected by the decrease or increase of the time taken for the agglutination of the emulsion in this dilution. Interval examinations are carried out on similar lines and results are compared.

The dilution of the serum employed for an initial agglutination examination in the case of B. typhosus, B. paratyphosi A and B, V. cholerae, Micrococcus melitensis and M. paramelitensis, 1 in 10; in the case of B. dysenteriae Shiga or Flexner-Hiss, 1 in 6. Agglutination appearing within three minutes determines a positive finding; after three and within four minutes a partially positive finding; four minutes if the full time limit is to be given to the test.

During the carrying out of many comparative examinations by the established high titre methods at the temperature of the laboratory, or at 37° C or 55° C, and by the slide method, it was found that when a specific agglutinin action was determined by a high titre method a positive result was also obtained by the slide method. Moreover, bacteriologically proven cases have shown a higher per-

centage of positive finding by the slide method, and there have been no inhibitory zones appearing with the dense emulsions employed.

It is of interest and value to know that while employing the *dense* emulsions of practically medium-freed micro-organisms, the writer has been able to demonstrate by the method, positive agglutination with sera in all dilutions, tested, when a zone of inhibition has appeared, with a thin emulsion and the short or long methods employed.

The agglutination test, however, has not been diagnostic in every case, but its value has been inestimable, and it has indicated in only the most exceptional cases misleading or constantly negative results. Observations have been made on more than 3,000 subjects. Bacteriological findings have given the necessary confirmation of the test in the majority of cases of infection. Its general utility may be recognized by the fact that some clinicians have been enabled thereby to test their patients' sera in their own side-rooms.

The prepared emulsions are placed in rubber-corked phials for preservation.

If an emulsion of the B. dysenteriae groups in the 1 and 6 serum dilution, or an emulsion of B. typhosus, B. paratyphosus A or B, M. melitensis or V. cholerae in the 1 and 10 dilution, shows agglutination by the formation of definite flocculi within 3 minutes and within 4 minutes, the reaction is considered partially positive to the micro-organisms contained therein.

In hot and dry climates, it has been found satisfactory to give a time limit of three minutes to the method, keeping at hand a basin of water with bars across on which the slide can rest, and over which it can be manipulated. Captain Garrow, R. A. M. C., has devised a rocking chamber into which a slide is fitted when prepared for the test.

For an immediate agglutination test, which proved satisfactory during an outbreak of plague, a serum test of 1 in 6 and 1 in 10 is employed. The 1 in 6 dilution of serum was used in the initial test.

DERMATOLOGY AND UROLOGY

Dermatology in a British General Hospital in France : Including the Differentiation of " I. C. T. " By Captain Frank Crozer Knowles, M. R. C., U. S. A. Dermatologist. U. S. A. Base Hospital, N° 10. Preliminary note of an article to appear elsewhere.

An account of the dermatological phase of the work of this hospital during the year of its direction by the American Army may prove interesting.

The staff of the Dermatological Department consists of the officer in charge, a non-commissioned officer, and two, occasionally three, enlisted men, while accommodation is provided for one hundred and twenty-eight cases.

The 1,913 cases which have been treated during this period of twelve months do not include patients who remained here for a few days en route for venereal hospitals, any cases of urticaria and toxic erythema which developed subsequent to admission, nor yet the very numerous battle casualties showing pediculi in their clothing, or " nits " on the pubic or axillary hairs.

The following table gives the variety and number of cases of each skin condition treated :

Abscess	50	Hyperidrosis	56
Angioneurotic edema	3	Ichthyosis	4
Acne	5	Impetigo	122
Acne Varioliformis	2	Keratosis palmaris et plantaris	1
Alopecia Areata	3	Keloid	1
Boils	381	Lupus Erythematosus	1
Callositas	8	Lupus Vulgaris	1
Carbuncle	7	Molluscum contagiosum	1
Dermatitis herpetiformis	1	Pityriasis Rosea	10
Dermatitis	35	Psoriasis	26
Epithelioma	2	Pompholyx	2
Erythema Multiform	4	Papilloma	2
Erythema modosum	1	Purpura	5
Erythema (toxic)	7	Pediculosis Corporis	10
Eczema	51	Pediculosis Pubis	8
Eczema seborrhoeicum	6	Pernio (Frost-bite)	50
Ecthyma	209	Paronychia	3
Erysipeloid	1	Seborrhea	5
Folliculitis	5	Sycosis Vulgaris	4
Herpes simplex	1	Scabies	510
Herpes Zoster	18		

Septic Ulcer	210	Tinea Versicolor	3
Schoelein's Disease	1	Tinea Sycosis	5
Syphilis (secondarias)	37	Urticaria	7
Syphilis (late)	15	Vitiligo	2
Tinea Circinata	2	Von Recklinghausen's Disease	1
Tinea Cruris	6		

In consideration of the vast numbers of sick and wounded to be dealt with, certain class names are given to various diseases, their correct differentiation remaining for later elucidation on the part of the specialist in the line to which the name is applicable.

One of the most interesting current class terms to the American dermatologist is " I. C. T. " (inflammation connective tissue), the synonym of the American Army term " Pyodermia ". These so-called " I. C. T. " cases are even eventually weeded out into their proper nomenclature, in the event that a trained dermatologist is present at their final destination. Like so many class terms, however, I. C. T. is frequently used to cover a diagnosis so diametrically opposite from the original intention that a dermatologist's opinion is absolutely necessary.

Out of the 1913 skin cases admitted to this hospital during the last twelve months, 995 have borne the diagnosis of I. C. T.

Several hundred other cases diagnosed as I. C. T. on the " field card " proved to comprise purely surgical conditions such as gangrene of the feet, advanced stages of so-called " Trench-Feet ", bone felon, necrosis of the bone, deep seated carbuncles, abcesses and flesh wounds of various types.

An important point requiring emphasis is that many skin conditions may prove unbenefited by treatment for a considerable period because of improper medication or because of an incorrect diagnosis. This latter point is well exemplified, as twenty cases of syphilis, eight in the second stage and twelve showing late skin lesions, were admitted to the hospitals improperly diagnosed.

Scabies also, under war conditions, differs greatly from that seen in civil practice, as the hands, and not infrequently the wrists, show little or no eruption, and pus complications are extremely frequent. Ecthyma, contrary to experience in civil practice, is here very prevalent as is also Septic Ulcer.

Emphasis should be laid upon the fact that greater care is required in diagnosing between active and non-active lesions of the skin. In numerous instances, cases have been sent to the hospital showing only pigmented marks (stains) on the skin, these areas signifying merely that inflammatory lesions had been present, but the active quality (redness) had entirely disappeared: following severe inflam-

mation, it may require many weeks for the stain to disappear.

War dermatology consists chiefly of animal parasites and their complications. Exposure, skin trauma, and vegetable organisms are responsible for a large toll.

Conclusions. All diseases of the skin, exclusive of uncomplicated cases of scabies and pediculosis, should be treated in areas where dermatological advice is available.

All skin cases requiring prolonged treatment should be isolated under the care of a dermatologist.

A dermatologist subject to call is indispensable for the diagnosis of cases of skin diseases of unusual type or rare conditions.

ROENTGENOLOGY

Simplification of Radiographic Technic. By Dr. Fornario, Read at Meeting of the Society for Medical Propaganda in war, Sept. 23, 1917 (Translation).

The writer gives the following particular concerning a method for obtaining a radiographic image directly impressed and fixed on papers. This paper is first rendered impermeable to water and then spread with a fluorescent layer of gelatine containing bromide of silver. The development and the fixing are the same as for plates.

Owing to the hardness of the sensitive layer, it is necessary to prolong the developing until the whole sensitized layer is completely affected and the image comes out clearly. It develops more clearly if 15-16 grams per liter of bromide be added to the solution. For the same reason it is better to prolong the fixing.

With these methods the radiographic image on paper will have the same strength and clearness and good contrast of details as with plates. The picture once obtained does not change.

With this paper it is possible to obtain a radiographic picture on several layers of the paper superimposed, using 16 to 20 at a time, with a very slight difference of clearness between the first and the last.

The image can be obtained on a plate and on one or several pieces of paper at one exposure. The layers of paper should be put over the plate because the plate diminishes the intensity of the rays, while the layers of paper leave on the plate only a slight

impression of their presence, without modifiying greatly the image on the plate. If one does not use the compressor (which limits the field), it is well to have the paper the same dimensions as the plate.

The article is accompanied with many half-tone illustrations of the good results obtained by this method.

The writer sums up the advantages of his methods as follows :

(1 A direct image.

2) A greater facility, rapidity, and simplification of the technic.

(3 Economy in expense, time, and the ability to take several copies contemporaneously.

4) The results, except in special contingencies, are equal to those on plates in most cases.

(5) Advantages in the manipulation and in the transportation of a pliable instead of a fragile plate.

7) Finally, the possibility of writing on the paper short notes or a history of a case.

The experiments were made by the writer in the radiographic room of the Institute Jolando, in the Territorial Hospital of the Italian Red Cross. The paper is now produced at the Tensi factory in Milan.

OPHTHALMOLOGY AND OTO-LARYNGOLOGY

Effects of Mustard Gas on the Eyes. By George S. Derby. M. O. R. C., U. S. A. No. 13. General Army Hospital B. E. F., U. S. Army Base Hospital N° 5.

It is important that our ophthalmologists should be well-informed as to the effects of mustard gas and be thereby in a position to assist their medical and surgical confreres when asked for advice.

About 80 o/o of the cases received show eye lesions of greater or less severity. The lesions are of the nature of a chemical burn of the skin of the lids, conjunctiva, and of the cornea in a considerable percentage.

The Lids. These are reddened, swollen, and often show humorous large bullae; they are kept tightly closed. The irritation and photophobia are so intense that not infrequently resort must be had to one or two drops of cocaine and the use of a lid elevator in

order to make a proper examination of the eye. Separation of the lids is often followed by a gush of tears.

In mild cases there is slight conjunctival infection with slight photophobia, but in severe cases the infection is severe with at times a very marked white edema and chemosis of the membranes, most noticeable in the area of the palpebral fissure. A secondary infection of the conjunctiva following gassing is not at all uncommon, and ciliary infection is frequent. In the more severe cases, careful examination will nearly always reveal a certain amount of corneal involvement, varying from a slight roughening of the epithelium to a well-defined opacity, usually in the form of a band extending across the cornea in the area corresponding to the palpebral fissure. In certain rare instances, probably where some of the fluid has come into direct contact with the cornea, this band assumes an almost porcelain whiteness.

Ulceration of the cornea is rare. The writer has seen but three cases with a definite loss of substance. According to the French these corneal lesions are stained by fluorescein. This also is rare. Sometimes as a result of corneal irritation, it may be necessary to use atropin three or four times a day to secure a satisfactory dilatation of the pupil, but in most instances, a drop of a one per cent. solution twice a day will prove satisfactory.

The intense photophobia, which occurs so frequently, may be explained by the corneal involvement,

Prognosis. Cerise divides these cases into three groups :

1. Benign, representing 10 to 15 o/o of cases. Duration 10 to 15 days.

2. Medium, about 80 o/o of the cases. Duration 5 to 6 weeks.

3. Severe, 3 to 5 o/o, seen in those with marked general symptoms, who often develop a broncho-pneumonia.

The larger proportion of the cases might be placed under Class 1.

Speaking entirely from the ocular standpoint, it may be estimated that nearly a third of the cases may be discharged to duty in a week, a third more at the end of the second week. Perhaps a fifth of the cases require three to four weeks, and the remainder as much as two months. With very rare exceptions complete recovery results.

Treatment. The eye should be protected from light, but not bandaged. Satisfactory eye shades can be manufactured from three or four thicknesses of blue paper. The eyes should be gently irrigated in severe cases every three or four hours with some bland solution, such as normal, saline, soda bicarbonate 1 o/o,

or boric acid, best heated to about 100 F before using. Liquid paraffin may be instilled later, or in the later stages argyrol in a 25 o/o solution is found to be soothing.

Castor oil has proved to be more irritating than liquid paraffin.

Atropin should be used in cases of corneal involvement, and a one per cent. solution instilled twice a day will usually be found to keep the pupil well dilated. Except in cases, the use of atropin may be discontinued after two or three days.

Cocaine should not be used as a routine, but is valuable for the first examination of the eye to relax the spasm of the lids.

Where hyperemia of the conjunctiva exists for a long time, a mild astringent collyrium may be used.

When the cornea clears and the infection begins to disappear, it is very important to get these patients up and accustom them to a greater degree of illumination.

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EDITORIAL COMMENTS

SURGERY IN BATTLE AREAS

"The Creed for Medical Officers of the American Expeditionary Forces, operating at the front, has been written", said a prominent American surgeon, after the Conference on Surgery in Battle Areas at the September meeting of the Research Society. This opinion was concurred in generally by others who had the privilege of hearing the prompt and decisive answers to various surgical problems that were discussed by the French, British, and American surgeons who took part in the Conference.

This surgical "Creed", like those for sects or religions, was

not all written in a day, historic as the occasion of this Conference may have been. It is not considered perfect and is subject to revision as advances in surgery are made, but it represents the sum of the applied knowledge regarding surgery in battle areas from the time when the priests cared for wounded soldiers of the hosts of Rameses I to the era of the highly trained and technical surgeons who are today directing the surgical services in the Armies of the Allies under Marshal Foch. Nor was it written by one man, or a group of men. Pasteur and Lister, more than any living men, had to do with its making; and other celebrated scientists, renowned clinicians and great military surgeons, whose names are a part of the history of medicine and surgery, also took part in preparing this "Creed" for surgeons in battle areas. Neither were there present at the Conference all those who have had the largest experience in dealing with war wounds; because the great surgeons from the Allied Armies, who announced the answers to the problems propounded, expressed the opinions of the surgical services which they represented; and their conclusions were arrived at only after years of experimental research by many laboratory workers, and clinical experience by a large number of surgeons in dealing with hundreds of thousands of wounded men.

A Carefully Prepared Surgical Creed

The questions relating to surgery in battle areas that were asked at the Conference were not hastily prepared. Groups of men from various hospitals, and representing several subcommittees of the Research Committee that are working on surgical problems, had been discussing plans for this Conference for months before it was called.

Weeks before the meeting of the Research Society typewritten copies of the questions relating to surgical problems in battle areas, that were printed on the program of the Conference, were sent to a number of surgeons in the French, British, and American Armies. Replies had been received from some of the ablest surgeons in the three armies before the meeting, and the representatives who took part in the Conference were prepared to give the answers for their respective Armies.

Following the meeting of the Research Society, a committee, after having carefully considered the stenographic reports of the discussions at the Conference, and having read replies that had been received before the meeting, prepared the answers to the problems. The questions and the answers were then carried to Professional Headquarters where a conference was held with those in authority there, and the "Creed" was made to fit conditions in the American Expeditionary Forces. It is therefore evident that no document could carry greater weight of authority, and that, in the report of this Conference, the surgeons of the American Expeditionary Forces have a code of action by which to live in performing their duties in battle areas.

For Surgeons in Battle Areas.

Having a "Creed" that has been prepared with such care, it is clearly the duty of medical officers to learn it and to follow its teachings; as completely as any religious enthusiast ever lived up to the mandates of the leaders of his faith. Each and every surgeon in the American Expeditionary Forces should not only read the report of the "Conference on Surgery in Battle Areas", but should also study it until he knows the problems and their answers so thoroughly that in times of stress of battle nothing, not even the bursting of bombs from the German Gothas around the hospital or clearing station where he is working, could make him deviate from its teaching. It should be as natural for him to carry out this surgical "Creed" as it is to disinfect his hands before performing an abdominal operation.

Reprints from *War Medicine* containing the report of this 'Conference on Surgery in Battle Areas" will be sent to every surgeon who has to deal with war wounds. In the relatively quiet periods at the front, division surgeons and commanding officers of hospitals might do well to have medical officers under them, who have any part whatever in dealing with wounded men, study this report, and require them to stand oral or written examinations on the problems discussed in it.

This "Creed" for surgeons operating at the front has been

written, is not regarded as perfect by those who have had a part in its making; and it is not intended to interfere with the individualism of the surgeon; because every case, after all, presents a problem which must be dealt with according to the judgment of the surgeon, whose conscience should direct him to do with the wounded patriot as he "would have done unto him", if he could put himself in the soldier's place.

A Tried Out Creed but Subject to Revision

Those who have prepared the questions and their answers relating to surgery in battle areas realize that there is much to learn regarding the treatment of war wounds, and every surgeon should feel it is his duty to make the effort to improve upon the methods advised in this report. Research workers in all the Allied armies will continue to direct their energies to surgical problems, and clinicians will be unceasing in their efforts to advance the practice of surgery, and as surgical technic and administrative methods are perfected this "Creed" will be revised.

There is no time, nor is it right to experiment with or to carry out new and individual ideas in treating wounded men in the push of battle. Only plans and methods which have been tried, and which have stood the test of many battles, with many workers, should be followed by surgeons in battle areas. This "Creed" expresses the faith of the masters in surgery at this time, and if its teachings are lived up to by the surgeons who have the responsibility of saving the limbs and lives of the brave men who are making the great sacrifice in the cause of liberty, many of the finest of America's manhood will be spared to fight, not only in war, but afterwards when men strong and true will be needed for the restoration and reconstruction of the homes, farms, and factories of the nations that have suffered to thwart the Prussian vandals in their efforts to conquer and overrun the world.

ANTISEPTICS VERSUS ASEPSIS

The value of the principle of antiseptics is called into question in military surgery, as it has been called into question in

civilian surgery and for identical reasons. What are the adverse factors inherent in antiseptics?

a) The antiseptic injures the defending tissue.

b) Through the operation of the law of biologic adaptation through struggle and survival, antiseptics tend to breed a strain of bacteria of heightened degree of virulence.

c) To the extent the surgeon divides the responsibility of wound treatment with a chemical agent, to that extent he fails to develop clinically in judgment.

That all antiseptics injure living tissue needs no discussion: that the breeding of strains of high virulence may occur is equally established; and it is not at all unlikely that the virulent infection bred in hospitals, especially in the period of strong antiseptics, arose through natural selection. The clinician knows that after a few days or weeks of the same antiseptics, but little further benefit is noted. Change is necessary. This is probably owing to the adaptation of the bacteria to the antiseptic. Then, too, we have found in the civilian clinic that if wounds are kept free from pocketing, free from the accumulation of wound secretion, and a certain standard of care of the patient as well as of the wound, the presence or the absence of the antiseptic matters little. It is thought by some that the Carrel-Dakin method renders more possible than other methods the prevention of pooling in recessed wounds. Asepsia puts up to the surgeon the sole responsibility of wound care — scrupulous wound care; and when, owing to the nature of the wound or other circumstance, antiseptics do better, they are used.

The surgeon, who has an abiding faith in a specific for infection, deteriorates clinically. This has never been more obvious than in this war. We have only to recall each wave of hope and faith in a new certified antiseptic, and with it we recall a wave of depreciated surgical judgment. It takes pains, and thought, and application, and eternal vigilance, to do our best surgery, and we all welcome the let-down we unconsciously grant ourselves with each antiseptic wave. Every new antiseptic must not only make good on its own account, but it must also make up the surgical deficit in the surgical personnel for which it is indirectly responsible.

With the judgment shown by the British surgeons in this battle in selecting the cases for delayed treatment at the base and those for immediate treatment at the front, it would seem that antiseptics are likely to play a lesser role; for those cases operated at the front — such as abdomens, chests, thighs, and joints — required little or no antiseptics: and those that were without operative treatment until the 58 1 3 hour did no better with antiseptics than without, as shown by the tables. Thus, apparently, the field for antiseptics is contracting — but not disappearing. Attention is becoming more and more focussed on the leading role of sound surgery, of the natural defense inherent in the wound, of accurate judgment as to the cases to be evacuated or later operated and those to be immediately operated: attention is focussed on efficient transport system. Any one of these as a practical matter is more important in battle conditions than any one, even all the antiseptics thus far offered.

THE WINTER CAMPAIGN AGAINST ACUTE RESPIRATORY INFECTIONS.

The season is approaching when the infections of the respiratory tract must be regarded as enemies more dangerous to our Armies than the Prussian soldiers fighting under Hindenburg: and it is comforting to know of the thorough preparations that are being made to combat the two types of parasites that are a menace to American soldiers in France, i. e., germs and Germans. The Chief Surgeon of the American Expeditionary Forces, aided by a staff of expert sanitarians and clinicians, is leading the fight on the streptococcus, pneumococcus, and meningococcus — enemies that killed so many good American soldiers last winter; while Marshal Foch and General Pershing are seeing to it that the poisonous gases, and the fire of shot and shell that are thrown out by the parasites of the genus hominis Germani group in their efforts to overcome their unwilling hosts, are met with a resistance that will destroy the invaders, or drive them back into Kaiserland — the only soil suitable for their growth and development, and where they must remain in ignominious retirement for ever.

As a part of the winter campaign against acute respiratory infections, one session of the September meeting of the Research Society was devoted to the discussion of that subject. Medical officers representing various medical units, both from the field and hospitals, had the opportunity at this meeting to hear the experience of the British and French with diseases of the respiratory tract, and they were also informed of the plans of the Medical Department of the American Expeditionary Forces for the winter campaign against this group of diseases.

Experience of the British and French

The British Armies in France have had remarkably good results in preventing respiratory diseases. Their statistics show much lower death and non-effective rates from this group of infections than has been the experience of the American troops in the United States and France. Colonel Beveridge of the British Medical Service opened the symposium on respiratory infections by a description of the methods that have been used to prevent them in the British Armies. Apparently the one most effective measure has been the proper ventilation of soldiers' quarters, particulary their sleeping apartments. British regulations require an ample allowance of air space for their soldiers before they move into the houses or tents provided for them; except, of course, in a drive where troops in large numbers have to be moved rapidly, when there may be temporary overcrowding. Colonel Beveridge said that the British have also been careful to isolate their cases of the acute respiratory infections as early as possible. He thought that probably one of the reasons why the British troops had had such a low rate from the acute respiratory infections was that they were seasoned and had been taught how to take care of themselves.

Professor Borel gave an interesting account of an epidemic of pneunomia among the Senegalese troops with the French Army. He said that the native French troops have suffered comparatively little with respiratory infections; but that those from their colonial possessions showed a high rate, particularly from pneumonia. The Senegalese apparently have an

inherent susceptibility to pneumonia. The death rate from this disease has been high among them, both in their own country and during their first winter in France. In this epidemic, the contagiousness, or infectiousness, of pneumonia was proved. The cases were thoroughly studied clinically, and bacteriological examinations showed that the pneumococcus of "strain No 24 of Lister's African group" was the infective agent. The serum obtained from this strain does not agglutinate with any of the American or European groups of pneumococcus. Professor Borel's report of the apparent immunity obtained by employing the pneumococcus vaccines made from the African strain found in this epidemic is suggestive and encouraging.

Respiratory Infections in the American Armies

Major Haven Emerson said that, in the first year of the war, respiratory infections were responsible for a large proportion of the deaths among American soldiers. He thought that the great prevalence and high death rate from measles, the pneumonias, and meningitis among the American troops might be explained partly by the fact that a large proportion of our troops come from sparsely settled country districts where they have not been exposed to many infections, and they therefore have a high degree of susceptibility to them. He said that it might be that the British and French troops, living as they do in cities, and in thickly populated countries, have acquired more or less immunity to respiratory infections. He said that reports from camps in the United States indicate that intensive exhaustive drilling has been responsible for the increased susceptibility to respiratory infections among certain troops.

Major Emerson said that the colored soldiers in the United States Army had suffered more, and that they showed higher death rates from respiratory infections than the white troops; even more than in civil life, though the incidence and death rates from pneumonia among all classes of the colored population in the United States is three times that of the whites. There is apparently a racial susceptibility among the blacks to respiratory infections.

Major Emerson showed that, incident to getting together a

large Army in a short time, there has been overcrowding in the quarters for troops. He hoped, however, that this could be remedied before winter. It is evident, he said, that there is a direct relationship to the amount of air-space provided for soldiers and the prevalence of acute respiratory infections.

Major Emerson further spoke of the need for an immediate campaign of education to teach our troops the dangers from coughing and spitting, and of the necessity for proper ventilation of their working and living quarters. He thought that the question of acute respiratory infections is one of housekeeping, environment, discipline, and sanitation.

The Susceptibility, Exhaustion, and Contact Factors

Major Zinsser, who had investigated some of the epidemics of pneumonia in American camps, thinks that in pneumococcus infections contact is not so important as the hygienic, or susceptibility, problem. He said that in the same tent he has found types 1, 2, and 4 of the pneumococcus, though in a number of instances the strains were of the same type, indicating contact infection.

As to the causes of the epidemics in the American Camps, he mentioned overcrowding as important, though the "overwork factor" played a prominent part. There was a very distinct improvement in conditions when the drill was not exhaustive. The method of gradually introducing soldiers to army life is to be recommended as a most excellent system in preventing respiratory infections. He said that the death rate from primary pneumonia was 12 o/o, and that the secondary type following measles was 29 o/o. It is self-evident that the prevention of measles is important, and that when measles appears in a camp prompt isolation of those infected, and daily or twice-daily inspections of all troops in the unit, should be made. He said that contact infection was the most important etiological factor in the secondary pneumonias due to the streptococcus.

Major Zinsser said that meningitis is in the same category as lobar pneumonia; that it is a question of susceptibility more than contact infection. He was not sure that the carrier had much to do with the prevalence of meningitis. He thought

the best methods of prevention are "rate determination" and careful bacteriological study of the men who have come in contact with an infected individual.

General Burtchaell said that air space in itself is not nearly so important as free ventilation in preventing acute respiratory infections. He thought it often better for soldiers to occupy limited air space for one or two nights and give them shelter, than to expose them to the elements outside.

The Winter Campaign.

The symposium on acute respiratory infections was but the firing of the first gun of the winter campaign against influenza, bronchitis, measles, the pneumonias, diphtheria and meningitis and other winter diseases.

At the October meeting of the Research Society the weak points in the defence of General Streptococcus and his death-dealing hordes will be laid bare, and a plan of campaign will be outlined to combat this enemy of the American Army.

Other preparations on a large scale are being carried on for a big offensive against the acute respiratory infections that will begin in October and last until spring. The Chief Surgeon and the Commander-in-Chief of the American Expeditionary Forces know the wiles and the strength of the enemies of the armies which they lead; and they have the men and the resources with which to carry on the fight against them. It therefore is safe to predict that the germs and the Germans that touch the American lines, will spend an uneasy, unprofitable and altogether miserable winter in 1918-1919.

FECES DISPOSAL AND FLY PREVENTION

It may be stated as a fact, which no sanitarian will question, that if all the excreta in the neighborhood of soldiers could be destroyed, and none of their food contaminated by infected feces, typhoid and paratyphoid fevers and the various types of dysenteries, which cause so many fighting men to be in hospitals when they are needed on the firing line, would be eliminated from army life. Therefore the solution of the typhoid fever and dysentery problem would seem to resolve

itself into educating soldiers first to dispose of their own feces, so that it cannot get into the mouths of others; and then to teach them how to keep other peoples' feces from getting into their own food and drink. This may not be a very elegant exposition of this great sanitary problem of the army, but it is a plain statement of the situation in the case; and soldiers should have unvarnished facts stated to them in order that they may be impressed sufficiently with the necessity for doing their part in the proper disposal of feces. Apparently this is a simple problem, and one that ought not to exist among civilized people; but the difficulties of feces disposal and the prevention of food contamination in a rapidly moving army are very great.

At the September meeting of the Research Society, a session was devoted to a discussion of "Feces Disposal and Fly Prevention". Many interesting and instructive facts were brought out by British, French and American medical officers. It was generally agreed by them that incineration of feces is the surest method of disposal, but it is difficult to get fuel in France, and the smoke from incinerators may give the enemy information regarding the location of troops. Incinerators are also difficult of transportation, and are therefore not adapted for use in rapid advances such as have been made recently by the Allies. Under these circumstances, the best method of feces disposal is to bury it as Moses advised 4000 years ago.

Sanitation in Areas Evacuated by the Germans.

With the Germans retreating as they have been recently, and with the likelihood of further "strategic withdrawals from untenable positions" by them, the Allies have not only to look out for the disposal of the excreta of their own soldiers, but a larger problem is the sanitation of the places evacuated by the enemy. From the unspeakable conditions left by the Germans in the Marne area, as described by one of the officers, and judging from the fact that an epidemic of dysentery among the Allied troops followed the occupation of territory that had been occupied by the enemy, it seems that German feces is more to be feared than Krupp guns. Someone has suggested that "the reason the Boche are called Germans is because they are

so full of " germs ". At any rate sanitary officers say that it is more difficult to " clean up " after the Germans, than it is to " clean them up " in battle.

Fly prevention is a serious problem, the solution of which, as brought out in the discussion before the Research Society, is the proper disposal of the excreta and dead bodies of animals, for in this manner the principal breeding places for flies are suppressed. This measure involves the co-operation of the civil population, which is at times difficult to obtain. One of the speakers said that the big blue flies that breed in decaying flesh of animals, and sometimes even in that of human beings in battle areas, are not so dangerous because that variety contaminates only meat, which is sterilized in cooking ; but the house fly that breeds in manure is the one that goes from the latrines to the mess table and kitchen, and deposits bits of human feces on bread, sugar, and other food that will not be cooked before it is eaten. A point of importance that was stressed is that while every effort should be put forth to prevent fly breeding near soldiers' camps, the proper disposal of feces is of the greatest importance, because flies get the bacilli of dysentery, typhoid, and paratyphoid from the feces of infected human beings.

Education on Personal Hygiene and Army Discipline Needed.

As brought out by several of the speakers, particularly by Colonel Gressinger, education and discipline of the soldiers regarding feces disposal and food contamination is the only method of preventing the enteric group of infections. Every soldier in the army should be so well trained and disciplined that under no circumstances, not even in the exhaustion following a battle, will he be guilty of soil pollution.

After all, army sanitation is a rural problem and should be attacked as it has been in some of the country communities in the United States, where every inhabitant has been taught the dangers of soil pollution, and where sanitary methods of feces disposal have been installed in every home. It therefore would seem that the liaison officer with the civil authorities is an important official, and that through him the co-operation of the civil population might be obtained.

While it is true that diseases due to food and water contamination are less prevalent in winter than in summer, cold does not destroy the organisms causing them. Soil pollution in the winter means that with the thawing of the snow, and the spring rains, streams will be contaminated and serious outbreaks will occur in warm weather. It is therefore important that the practical methods of feces disposal and fly prevention, as presented to the Research Society, the report of which is published in *War Medicine*, should be carried into effect in each unit of every division of the American Expeditionary Forces at the earliest possible time. It is up to the division and regimental surgeons to get the active co-operation of the line officers in a campaign of education on sanitary matters, which will extend throughout the army. Through them they can teach every soldier the dangers of soil pollution, and that it is as much his duty to protect himself and his comrades from the enemies behind and within the lines, that lurk in contaminated food and drink, as it is for him to "go over the top" after the foes that he can see.

THE PUBLICATION OF PAPERS BY MEDICAL OFFICERS OF THE A. E. F.

Medical officers of the American Expeditionary Forces have been working in the war zone long enough to have had considerable experience in dealing with the problems relating to military surgery.

Since many of the best trained men in the United States, representing all the branches of medicine, are with the American Army, and since they are giving the best that is in them to their work with sick and wounded soldiers, it is to be expected that they have made observations which have enabled them to improve upon medical methods and surgical technic, and that they have made advances in sanitation and preventive medicine which, when recorded and published, will be valuable contributions to the sum of medical knowledge.

The Spanish-American War, brief as it was, and though it was an insignificant affair compared to the present world conflict, set many of the ablest minds in American medicine

to work to solve the problems of yellow fever, malaria, typhoid fever, and dysentery, diseases which had caused many more deaths among United States troops than Spanish bullets. As a result, the transmission of yellow fever by the stegomyia fasciata mosquito was proved; practical methods for preventing malaria were evolved; and the house fly was convicted of carrying typhoid fever and dysentery. These and many other valuable contributions were made to medicine in the Spanish-American War, which in their far reaching effects have more than compensated for the expense and the man loss in that conflict.

The French and British contributions to the science and literature of war medicine and surgery during the past four years have been epoch making in many respects; and a number of American surgeons and research workers have already reported original investigations and improvements of accepted methods that have been recognized as great advances in the treatment of wounds and in the prevention of disease. War medical literature, however, by American medical officers has not been very prolific up to this time.

Duty of Medical Officers to Contribute to the Medical Literature of the War.

It cannot be the lot of every army surgeon to make great discoveries, but each man who is dealing with the medical and surgical problems of the war should not only do his very best with present methods, but he should try to improve upon them. If he makes an observation that enables him to get better results in treating his patients, or if he makes an original investigation of value, it is his duty to make reports on his work and allow it to be published. Others may then have the opportunity of verifying his work and, if it proves to be of value, of applying the knowledge for the general welfare of the army.

Of course a medical officer should not rush into print unless he has something of value to publish; but if a physician has had a large or unusual experience which may be helpful to others, it is his duty to write it up and publish it in medical journals that will be read by his confreres. It is not always

necessary to have something new and original before contributing an article to a medical journal; but if the experience of a physician or surgeon proves that an old method is better than new ones that have been advised, it is worth while publishing his observations.

If physicians waited until they had something entirely new and original to publish there would be few medical books and journals published. A well known medical editor reviewed a number of the leading medical journals of several countries and his conclusions were that less that five per cent of the matter in them was new or original. He did not think that this fact made medical journals less valuable, because they contain the sum of the experiences of the men who are accomplishing most in medicine; and often the reiteration, or the restating from a different view point of well known facts is production of practical results.

It is certain that medical officers with the American Expeditionary Forces will prepare many important papers for publication in medical journals; and a problem for consideration is how to get their work published at an early date and placed in the hands of their confreres who are dealing with the same problems. It is to be expected that most of the papers will be published in the medical journals of the United States, though a number have appeared in British journals. It is sometimes several months before a paper can be published in a medical journal, because such a publication usually has enough manuscript on hand for a number of issues, and the mail problem is a difficult one during the war.

Abstracts and Reports in War Medicine.

War Medicine does not publish original articles, but it would like to be a medium for disseminating reports of the work of medical officers with the American Expeditionary Forces. It can and will publish abstracts of original articles and reports by medical officers before it would be possible to get them published in medical journals.

While all medical journals expect exclusive right of publishing the papers which appear in them, no editor objects to the publication of abstracts of papers either before or after

they appear in his publication; and during the war when time is such an important element it is essential that the observations of army surgeons be published as soon as possible.

A circular from the Chief Surgeon's office, published on page 425, states that the Surgeon General at Washington has ruled that before a paper by a medical officer in the United States can be published it must first be sent to his office for approval. Therefore the proper procedure for a medical officer to follow, when he desires an article published, is to submit two copies to his commanding officer, who sends them with an endorsement to the Chief Surgeon, who in turn makes his endorsement and transmits them to the Surgeon General in Washington. If the Surgeon General approves the publication of the article, one copy is sent to the journal designated by the author and one copy is kept on file in the Surgeon General's Office.

According to a recent arrangement, the Chief Surgeon is allowing *War Medicine* to publish abstracts of original articles by medical officers so that there will be no delay in disseminating information contained in them among the physicians in the American Expeditionary Forces. Authors of such articles can be helpful to their confreres and at the same time add to the value of *War Medicine* if they will make an abstract of from 250 to 750 words of the articles and send two copies with the copies of the original articles to the Chief Surgeon. Often the author's abstract is of greater value than that of the most experienced medical reviewer.

Consultants, division surgeons, commanding officers of hospitals, chiefs of laboratories, and heads of other groups of medical men, who are engaged in practical or research work with the American Expeditionary Forces, would encourage medical officers to report their work, provided of course that they have something of value to publish. Medical officers should be made to feel that, if they have done worthy work and it is published, they are making history as much as the men who are on the firing line, and *War Medicine* would like the privilege of publishing at least the resume of the current medical and surgical history of the War as made by American physicians serving in France and England.

SHOCK FOLLOWING EXTENSIVE MUSCLE INJURY

Major W. B. Cannon, Chairman of the Committee on Shock of the Research Committee of the American Red Cross in France, at the September meeting, made a report of experiments on shock in relation to muscle injury that were begun by him in co-operation with Professor Bayliss in London, and reported to the Research Society on March 15 (see *Medical Bulletin*, April, 1918, p. 426). These experiments have been continued recently at the Laboratory of Surgical Research of the American Expeditionary Forces.

Major Cannon said that "evidence has been obtained in support of the following statements:

1. The crushing of muscles in a hind leg is followed by a fall of arterial pressure beginning in about 20 minutes and reaching in about an hour a shock level.

2. This effect occurs even though nerves to the leg are severed; it is therefore not of nervous origin.

3. If the blood vessels of the leg are tied and the muscle injured, the pressure drops only after the blood flow is restored.

4. If the shock pressure has been caused by muscle injury, tying the vessels may be followed by a progressive rise of pressure to the normal level.

5. The effects of muscle injury may pass away with spontaneous recovery of pressure.

6. The lowered pressure after injury is not primarily due to extravasation of blood and lymph into the injured tissues. The measured amount is insufficient."

General Bowlby, Director of Surgery of the British Armies in France, who was present at the meeting of the Research Committee which, by the way, always meets immediately following the afternoon session of the Research Society, said that these observations had a practical bearing in surgery, since they proved that the longer a completely smashed limb is left without amputation, the worse the shock. It is, therefore, important that the completely crushed limb be removed as early as possible; and that, if shock is due to absorption of materials from damaged tissues, after an extensive muscle wound a tourniquet applied as tightly as possible after the

injury would reduce shock. General Bowlby also said that he had observed clinically that cutting across completely smashed tissues helps the patient.

Major Cannon said that the conclusion to be drawn from these observations are the necessity of keeping the blood pressure of shock patients from falling below a critical level of 80 mm. of mercury, and the need for the surgeons to be prepared to operate as soon as possible after injuries in which there is great damage to muscular tissue.

THE SALVAGE OF SOLDIERS IN CONVALESCENT CAMPS

The salvage of soldiers who have been lightly wounded and the rapid return of those who are convalescent from disease, are problems of great importance to any Army. They are of particular interest to the medical officers of the American Expeditionary Forces at this time since American soldiers are fighting with our Allies on a large scale, thus making it necessary to care for many wounded men.

In this number of *War Medicine* is published an abstract of an address on this timely subject that was recently delivered by Colonel Bailey K. Ashford to the medical officers of the United States of the Sanitary Field Service School of the American Expeditionary Forces. Colonel Ashford has outlined a working plan for the salvage of convalescent sick and wounded soldiers that seems admirably adapted to the needs of our army. In prefacing his remarks on Convalescent Camps, Colonel Ashford said:

"There are at least four features in the work of the medical corps of an army today which may have recently placed medical officers in the position of being among the most active of the forces with which the enemy has to count: for by its medical corps an army *can* to a large extent delay and repair the ravages of war in men lost to the fighting line. In other words, the medical corps of an army has ceased to be a corps of doctors pure and simple, appendages of an army and non-combatant in every sense as far as war goes, who employ their profession to alleviate pain and repair the damaged indi-

vidual. Today they constitute the most valuable of all salvage corps for men, the only corps by which damaged men *can* be salvaged. Naturally these officers are rewarded for the application of the medical sciences to the art of war by being deliberately bombed, gassed and shelled by an enemy who has not failed at all to realize the importance and value of their contribution. There are at least four outstanding factors in this new conception of the duties of a medical officer which make him willy-nilly an active participant in the winning of battles.

(1) The prevention of disease — by sanitary and by preventive medicine.

(2) The rapid collection and forwarding of the wounded and gassed, with intelligent first aid, such as the transportation of fractures in extension, the preventive treatment of shock, the immediate relief of the gassed, and the direct removal in the most comfortable and expeditious manner of all casualties to hospitals adequately provided to fulfill the requirements of modern military medicine and surgery.

(3) The prevention of infection of wounds by the surgical removal of the contaminating dead and dying tissue upon which organisms have heretofore been able to thrive; and

(4) The rapid return to duty, through convalescent camps, of men who heretofore have spent months in the zone of the interior, many never returning to the lines and being lost to the army. »

Convalescent Camps.

« The whole idea of a convalescent camp or depot is: a point which the Medical Department operates to salvage men who would otherwise occupy a bed in a base hospital, or be sent back to their homes, or some watering place where the military spirit into which they have been inducted is more or less rapidly lost without any corresponding real benefit to their physique. The object is to get men away from base hospitals, who will need no further active surgical or medical treatment, but merely medical surveillance, and who especially need to be brought back into a military atmosphere, rather than be allowed to remain in a convalescent frame of mind. The two

absolute essentials of a good convalescent camp are (1) that it should be a place which should combine all the pleasanter features of military life and its comforts, without supplying luxuries or permitting vices which tend to pamper the soldier and unfit him for his better return to the lines.

To show what can be done in this respect, Convalescent Camp No. 1, of the British, has returned to the Front direct 5,000 men in six months, and Convalescent Hospital No. 10 about 1,500 per month. In general the statements from the convalescent depots and camps seem to make it clear that the time spent in convalescence by men at base hospitals has by means of these camps been reduced from nine months to one month, in the 50 o/o of cases that are returned to duty at the Front.

These figures are approximate but were given me by their commanding officers. Lieutenant-General C. E. Burtchaell, Director Medical Services, British Expeditionary Forces in France, stated that out of 1,015 men at a convalescent camp, 756 were returned to duty cured as type "A" men, 127 remained as P. B., 123 were returned to base hospitals, and only 9 sent home to England.

In connection with the first essential of a good convalescent camp — that it should be run entirely by medical officers — it should be remembered that there are points at which damaged men are salvaged, and damaged men can not be salvaged save by the scientific medical officer whose aim and ambition is to put as many able bodied men back in the fighting line as soon as he can, and whose military sense is developed pari passu with his specialty. Such men can not be salvaged by mere doctors, nor by mere scientists, however well meaning they may be. This is the legitimate field of a well trained officer of the medical corps, who has really learned to apply his profession to the conditions of war."

THE BRITISH MEDICAL SUPPLEMENT

The British Research Committee, in compiling and reviewing the enemy medical literature, and publishing it each month as the Medical Supplement to the Review of the Foreign Press, is performing a service of real value to the medical officers of

the Entente Allies. The Medical Supplement also publishes reviews of important French and Italian articles.

The reviews that appear in the Medical Supplement are of unusual value because they are prepared by specialists in the various branches of medicine and surgery, many of whom are among the most celebrated men in England and Scotland, who not only give the author's viewpoint but often make critical comments upon the articles which they abstract. This is of particular importance in dealing with the enemy literature.

Judging from the reviews or abstracts of German and Austrian medical articles that appear each month in the Medical Supplement even the war has not had a deterring effect upon the prolific pens of Berlin and Vienna doctors; though their publications are of less scientific value than when they had access to the literature of other nations, and could plagiarize the idea and researches of the advanced thinkers and workers in medicine and surgery outside of Germany and Austria. While the statements made by German medical authors must be discounted, because much of what they have claimed as original, both before and since the war began, belongs to the medical men of other nations, it is proper to learn all that we can from them, as well as to give them full credit for their good work. If the Germans or Austrians have made any advances in the treatment of war wounds, or in the prevention and treatment of disease, they should be adopted by our medical men, though what a Boche author says should be verified before it is accepted as a fact.

Brain Injuries.

In the August number of the Medical Supplement a neat compliment is paid to Lieut.-Col. Harvey Cushing, Senior Consultant in Neurological Surgery of the American Expeditionary Forces. In discussing the German literature on the treatment of injuries of the brain it says: "In this respect the epoch-making work of Harvey Cushing (*Brit. J. Surg.*, Bristol, 1918, 5, 558) is far in advance of anything that has yet appeared both as a clinical record and a practical guide to the surgeon. Similarly, the same author's minute details as to treatment that appeared in the *Brit. M. J.* Lond., 1918, Feb. 23, are of

much higher merit than anything hitherto published in enemy countries. So, also, the work of Chatelin and de Martel (*Blessures du Crâne et du Cerveau*. Paris, Masson, 1917) gives a better general review of the whole subject than is to be found in German literature."

Since the Medical Supplement supplies a large number of copies to the American Expeditionary Forces in exchange for *War Medicine*, and since its reviews of the German and Austrian medical journals are so well done, *War Medicine* does not publish abstracts of enemy literature, but confines its abstracts to articles from the French, British, Italian and American journals.

While the Medical Supplement reaches most of the hospitals, and other medical units of the American Expeditionary Forces, if medical officers desire personal copies, they may purchase them (price one shilling net) through any bookseller, or directly from H. M. Majesty Office, Imperial House Kingsmay, London, W. C. 2.

INCREASED RANK FOR MEDICAL OFFICERS

The Owen Bill, which provided that medical officers in the United States Army be given the same relative rank as those of the Navy, and that the proportion of general officers in the Medical Department be the same as in the other branches of the service, has been defeated. However, a substitute bill was passed as an amendment, or "rider" to the Army appropriation bill, which provides for one major-general and two brigadier-generals in the Medical Reserve Corps. This amendment provides for an increase in the grades from colonel down, which will be relatively greater than the number of general officers: but it is not known yet how much this will affect the medical officers of the American Expeditionary Forces.

A recent order from the President obliterates the lines of distinction between the Regular Army, the National Guard, the National Army and the Reserve Corps, and brings every officer and soldier serving under the American flag into the United States Army for the period of the war. Whether or not this order will affect the administration of this act is not

understood by the writer, but it is certain that the Chief Surgeon will secure as many promotions as he is allowed to do for the medical officers serving in France and England.

This legislation, though it does not adequately recognize the Regular Medical Corps, or the Medical Reserve Corps, will help to give the Medical Department of the Army the standing which it deserves; and judging from the laudatory remarks of Senators regarding the work and sacrifices of the members of the medical profession in serving their country in this crisis, there is hope that during the next Congress, which assembles in December, more liberal provision will be made for both the regular and reserve medical officers of the army.

The Amended Bill.

The following is the text of the Amendment 65 to the Army Appropriation Bill providing for an increase in the Medical Department:

"The Medical Department of the Regular Army is hereby increased by one assistant surgeon-general, for service abroad during the present war, who shall have the rank of major-general, and two assistant surgeons-general, who shall have the rank of a brigadier-general, all of whom shall be appointed from the Medical Corps of the Regular Army."

"The President may nominate and appoint in the Medical Department of the National Army, by and with the advice and consent of the Senate, from the Medical Reserve Corps of the Regular Army not to exceed two major generals and four brigadier generals."

"The commissioned officers of the Medical Corps of the Regular Army, none of whom shall have rank above that of colonel shall be proportionately distributed in the several grades as now provided by law."

"The commissioned officers of the Medical Reserve Corps of the Regular Army, none of whom shall have rank above that of colonel, shall be proportionately distributed in the several grades, as now provided by law for the Medical Corps of the Regular Army, provided that nothing in this act shall be held or construed so as to discharge any officer of the Regular Army or deprive him of a commission which he now holds therein."

CIRCULARS, BULLETINS AND REPORTS

ISSUED FROM THE OFFICE OF THE CHIEF SURGEON, OF THE AMERICAN EXPEDITIONARY FORCES IN FRANCE.

Under this heading will be published extracts from circulars and bulletins issued by the Chief Surgeon of the Medical Department of the American Expeditionary Forces in France. It is believed that these will be of general interest and value to medical officers.

EXTRACTS FROM C. S. O. CIRCULARS

PAPERS FOR PUBLICATION.

The attention of all medical officers is called to the following memorandum which has been received from the Surgeon General. Papers for publication should be sent through the office of Chief Surgeon.

" Attention is called to the memorandum quoted below, which was issued March 27, 1918. In many instances paragraph three (3 has been overlooked. It is essential that this office receive *in duplicate* all professional papers submitted for authority to publish:

" 1. Attention of medical officers is directed to the provisions of paragraph 423 M. M. D. Medical officers will not publish professional papers requiring reference to official records or to experience gained in the discharge of their duties without the previous authority of the Surgeon General.

2. Numerous scientific papers written by officers of the Medical Department have recently appeared in the medical press without specific authority from this office. This practice will be discontinued and the above regulations will be strictly complied with.

3. Officers desiring the publication of professional papers will submit two copies to the Surgeon General with request for permission to publish same. Upon approval, a copy will be forwarded to the journal designated by the officer for publication. "

INSTRUCTIONS CONCERNING THE TREATMENT IN ORTHOPEDIC CONDITIONS INCLUDING FRACTURES AND JOINT INJURIES.

1. Upon the recommendation of the Chief Consultant in Surgery, and with the approval of the Director of Professional Services, the following instructions are published for the information and guidance of all concerned:

2. The work of the Division of Orthopedic Surgery in the medical organization of the army divides itself quite clearly into

two parts, one having to do with the preparation of the men for the expected combat, and the other assisting in their recovery if wounded. The first endeavors to see that they are so trained that there will be the greatest possible vigor for the combat, and that physical defects which might have rendered them ineffective are corrected. The second has to do with the treatment of the men, if injured, so that there will be the least possible ultimate crippling or interference with function. The first has to do with saving men for service who would otherwise be discharged as physically unfit and also, as the result of careful training, increasing the number of days that should be expected of the men for active duty. The second has to do with the saving for service of men who but for such work might not have lived, or, had they lived, been so crippled as to be of no use to the Army.

3. Without such methods of treatment available for those needing such care in the pre-combat or training period, large numbers of men will be lost for active duty as the ordinary medical measures can only give temporary relief.

4. Without such methods in cases of combat or other injury there will be much unnecessary loss of function and much of the acute surgical treatment will be purposeless.

5. In each of the large hospital centers, a base hospital with special personnel and equipment for caring for such cases will be installed, while in the detached base hospitals special services will be established so that there will be the least possible transferring of cases from one hospital to another.

6. Consultants in Orthopedic Surgery will be assigned to groups of hospitals whose function it will be to keep in touch with the orthopedic work of the given group. These consultants should be freely used by the staff of the respective hospitals and can be reached through the commanding officers of hospital centers.

7. To best accomplish the purposes of the Division and to make the services of its members available, the following instructions will govern :

Amputations. 8. Cases of amputation of either extremity will be assigned as soon as possible to the orthopedic service for the needed special treatment. A guillotine amputation for instance, without other injuries, can usually be moved without risk in one week, and with suitable measures rapid closure of the wound is usually possible so that the artificial leg can be fitted, and many times the man can get about without crutches in from four to five weeks from the time of injury. It is desirable that transfer to

the orthopedic service take place as early as possible before contractures have taken place, so that the temporary artificial limb, in case that is desirable, can be most favorably fitted and the muscles used to the best advantage,

Tendon Injuries or Inflammations. 9. The cases of injury to the tendons, or inflammation in or about the tendons, should be assigned as soon as the primary wound healing is well established, or as soon as the acute inflammatory reaction has subsided to the orthopedic service. Early transfer to these special services is important in order that the treatment having to do with the full restoration of function in the part that has been injured or inflamed may be established at the earliest possible moment, and before adhesions have formed or become organized.

Flat feet, Weak Feet or Pronated Feet. 10. Cases of flat, weak or pronated feet associated with pain, swelling or inflammation, when admitted to a hospital should be assigned to the orthopedic service. As soon as the acute symptoms have passed, the cases should be transferred to the nearest convalescent camp. From here, in keeping with the degree of difficulty, the cases should be transferred for full duty or to the Orthopedic Training Camp, Depot Division, for training to fully overcome the weakness, or for non-combat duty under Class "C" classification.

11. No cases of uncomplicated flat foot should be exempted from service or recommended for transfer to the U. S., as all can be made useful for military service.

Spinal Strains, Weak Backs — Chronic Back-aches. 12. The cases of weak, painful or lame backs, or of sprain of the spinal or sacro-iliac joints, should be assigned to the orthopedic service. From here they should be transferred to the nearest convalescent camp as soon as the acute symptoms have passed, and from there, after a reasonable time, they should be transferred either for full duty, or for non-combat duty under Class "C" classification.

General Bad Posture. 13. Cases of general bad posture, which is commonly associated with lack of vitality or general endurance, as well as being part of the condition leading to weak feet and weak backs, should be sent for training in the Orthopedic Training Camp, Depot Division.

Fractures. 14. For all cases of fracture of bones other than of the head or face, or of extensive muscle injuries, it is of the utmost importance that proper splints be applied at the earliest possible moment so that the transfer of the patients to the hospital in which treatment is to be given is associated with the least possible damage to the tissue adjacent to the injured bone. The

Thomas Leg Splint, the Hinged Half Ring Splint, the Thomas Hinged Arm Splint (Murray modification), the Cabot Posterior Splint and the Ladder Splinting are the appliances most needed for such work.

15. In case the fracture is compound, the wound treatment at the evacuation or other hospitals should follow the principles outlined by the Chief Consultant of Surgical Services.

16. After the primary wound treatment has been given, thes cases should be transferred to the orthopedic service in which th most approved methods for the early restoration of function to th injured part will be available. An effort should be made to transfer the cases to such services, wherever possible, within a week or ten days of the time of injury, this being the most favorable time as regards bone repair. All fracture cases which, for any reason, cannot or should not be transferred to one of the services as indicated above, should be reported to the Senior Consultant in Orthopedic Surgery, or to the Orthopedic Consultant of the special area.

17. Simple fractures should not be converted into open fractures except under very exceptional conditions or after consultation with one of the orthopedic consultants. A result which may not be as perfect anatomically as might have been obtained by open operation may, nevertheless, be functionally good. This is so commonly the case that the risk of infection which is greater under the war conditions than in civil life should be avoided when ever possible.

Joint Injuries. 18. All injuries of the joints should be protected with the same care for transport to the hospital in which the treatment is to be given as has been indicated for fractures. Suitable splints should be applied immediately and the standardized list of splints of the Army provides types that will meet all the needs.

19. In case the injury is associated with open wounds, the principles of wound treatment are those which have been laid down by the Chief Consultant of General Surgery.

20. Since in all such injuries ultimate function of the joint is the chief requisite, treatment having for its purpose the restoration of function should be instituted as soon as possible, and for this purpose it is desirable that cases of such injury be transferred, as soon as the primary wound treatment has been given, to the orthopedic service. It is important that such transfer be made before necessary adhesions have formed, so that the restoration of function can be obtained with the least possible loss of time. In all such functional restoration it should be clearly understood that

while motion is to be encouraged at the earliest possible moment, it should consist entirely of active motions performed by the patient, in which case the reflex muscular contraction will protect the joint from undue injury. All passive motion should be avoided.

21. Operations upon the joints that are not emergency in character should not be performed until after consultation with one of the consultants in orthopedic surgery.

Transfer to United States. 22. It will be the policy to send to the United States, as soon as transportable, all cases that are of Class "D" type, or cases in which prolonged regiment will be required for restoration to duty.

Collection of Museum Material for Medical Education and Research.

1. *Object.* This circular is for the information of these branches of the service whose co-operation and assistance are necessary to enable the Army Museum to discharge its duty of collecting all those things which may be used for medical education and research, or which may be of historic interest. This material will consist of pathologic specimens, bacteria, animal parasites, missiles, armor, instruments, apparatus, casts, models, paintings, drawings, diagrams, charts, statistical tables, cinema films, photographs, radiographs, lantern slides and other things pertaining to the preservation of the health and the prevention and treatment of the diseases of United States soldiers, or to the history of the Medical Department of the Army.

2. *Scope.* In France all collections will be limited to those things which cannot be obtained readily in the United States, or which are necessary for study in the A. E. F. More specifically these will relate principally to war wounds, especially lesions of bones and vital organs, gas poisoning, trench foot, gas gangrene, traumatic and "shell" shock, to infectious and parasitic diseases of special menace to the A. E. F. and to material of historic interest. Other material may be included if obviously desirable. It is requested that all medical officers in the A. E. F., cognizant of desirable museum material which they are not in position to direct into proper collection channels, should notify the Director of Laboratories, A. E. F. (Museum Unit) A. P. O. 721.

3. *Responsibility.* It is the duty of each medical officer in the A. E. F. to direct into proper channels all such desirable material coming to notice. In each medical unit the pathologist, or, in his

absence, some other medical officer, will be responsible for the collection, preservation and shipment of all such material obtainable in the unit.

4. *Use in A. E. F.* Collected material required for investigation in the A. E. F. will be shipped as early and as directly as possible to the groups of officers conducting the investigations, in such manner and quantity as they may request through the Director of Laboratories, A. E. F. After serving the needs of the immediate investigation, this material, if still of value, will be preserved for use elsewhere.

Requests for material required for teaching in the A. E. F. should be made to the Director of Laboratories, A. E. F., who will direct from what source it shall be supplied.

5. *Concentration Points.* All other collected material will be shipped without unnecessary delay directly to concentration points as follows :

(*a*) To the Central Medical Department Laboratory from all hospitals in the Southeastern portion of the Zone of Advance and from other hospitals to which the Central Medical Department Laboratory is most readily accessible.

(*b*) To American Red Cross Military Hospital No. 2 from all hospitals in the middle section of the Zone of Advance to which it is most readily accessible.

(*c*) To U. S. Base Hospital No. 4 (B. E. F. No. 9, General Hospital) from all hospitals in the Northern portion of the Zone of Advance to which it is most readily accessible.

d) To U. S. Base Laboratory of Base Section 1, or to U.S. Base Laboratory of Base Section 2, from all hospitals to which either of the above points is most readily acccessible.

The local Railway Transport Officer should be consulted as to the most accessible point for concentration of packages at the time shipment is to be made.

6. *Final Disposition.* At the concentration points the Museum Unit will take charge of the further preparation of all material and its shipment to the Army Medical Museum. There it will be cataloged and such portions of it as are necessary immediately redistributed as loans in accordance with a recent decision of the Surgeon General's Office, as follows :

(*a*) Teaching material to U. S. Army Schools for medical officers.

(*b*) Teaching and certain research material to the undergraduate medical schools of the United States (all of which are now under the supervision of the Surgeon General's Office).

c All historic and surplus material will be held in the Army Medical Museum for local use or future loans.

7. *Pathologic Specimens.* All pathologic specimens suggested in par. 2, from both operations and autopsies, should be preserved as follows:

(*a*) Gross Specimens. These should be dissected enough to disclose the character of the lesion and to permit proper fixation. The surface blood should be rapidly washed off with weak formalin (1 to 6 or previously used). Each should have securely attached to it a tag of starched cloth or thick, tough paper on which is heavily written in black lead pencil or typewriting the name, rank and organization of the patient, the anatomical name of the specimen, the diagnosis of the lesion, the hospital number, the serial number of the specimen, if autopsy material, the autopsy number and the date of collection. Each specimen should be fixed, and preserved until shipped, in 5 to 10 times its volume of Kaiserling No. 1 solution, the formula of which is as follows:

Potassium nitrate	15 grams.
Potassium acetate	30 "
Formalin	200 c.c.
Water	1000 c.c.

These materials may be requisitioned.

Sodium salts may be used instead of potassium. If materials for other methods of color preservation are at hand, they may be used, but the specimens kept separate from others in shipping. If no salts are obtainable 10 to 6 formalin may be used. Hollow organs, lungs, intestines, etc., should be filled with the solution to their normal size and caliber. Where time permits, the vessels of large specimens should be injected with the solution.

The solution fixes very rapidly and rigidly so that it is necessary to use care when specimens are placed in it that they are not deformed by pressure. Soft organs, (brains, lungs, etc. which may be injured by pressure, should be fixed in individual containers, (jars, granite-ware pails or pans, kegs, etc.). Other tissues may be fixed several together in tubs, barrels, casks, etc.

Specimens should not be placed in containers in contact with metal nor in new wooden vessels the walls of which may contain tannin. If new wooden vessels are used they should be coated inside with paraffin. Large containers — earthenware jars, barrels, casks, etc. — should be obtained locally. Wide-mouth bottles and small specimen jars may be obtained by requisition.

After preliminary fixation the specimen should be changed at

least once to fresh fluid which may be reduced in strength to 10 o/o formalin. Delicate specimens, such as pieces of intestine or blood vessels, need to be carried through the entire Kaiserling process rapidly if a brilliant color is to be preserved. With all other specimens only the Number 1 need be used.

Where the specimen is a bone the soft parts should be left attached and the specimen treated similarly to lesions of soft tissues alone.

(*b*) Material for Microscopic Examination. Tissues intended especially for microscopic examination should be cut with a sharp knife or razor into thin blocks (not over 0.5 cm. thick) and placed immediately into 20 to 50 times their volume of fixative. (Zenker's fluid, formol-Zenker, neutral Zenker, 10 o/o formalin, 95 o/o alcohol, or other). Their source should be accurately noted, described and sketched. Their subsequent treatment should be that appropriate for the fixative. Special attention is called to the necessity for fixing tissues intended for cytologic study as soon as possible (under two hours) after circulation in the part has ceased. Wide mouthed bottles or small glass jars tightly closed should be used as containers for histologic material.

8. *Shipment.* When pathologic specimens have been fixed for two weeks or more they should be well padded with absorbent cotton wetted with the solution in which they have been last immersed, then wrapped in water proof paper (to be obtained by requisition) and packed with paper, excelsior, hay or similar material in a strong wooden or tin box or a barrel and shipped to the most accessible point of concentration. (See paragraphs 5 and 6). Each package should be marked with the hospital number, the serial numbers of the specimens, the autopsy number, if any, and date of shipment.

At the same time there should be forwarded by mail or courier an inventory of the contents of each package accompanied by abstracts of the clinical records of operation specimen, and of clinical and autopsy records of autopsy specimens. The name of the pathologist or other medical officer who may be specially interested in the specimen should be given.

Army Regulations authorize transportation of all museum material by the Quartermaster Corps. Packages of specimens weighing 7 lbs., or less, should be directed on a penalty envelope, marked official, and delivered to an A. P. O. of the Military Postal Express Service with explanations of their character and the importance of their prompt delivery to prevent spoiling.

9. *Bacteria.* Army Regulations provide that cultures of all

pathogenic bacteria isolated in the A. E. F. shall be sent to the Central Medical Department Laboratory for confirmatory identification. The museum supply will therefore be drawn from the Central Medical Department Laboratory.

10. *Microscopic Slides.* Microscopic slides containing data which cannot readily be duplicated in other material sent from the same source should be sent to the appropriate concentration point.

11. *Animal Parasites.* Specimens of animal parasites — if possible living — such as lice, fleas, mites, bugs, flies, mosquitoes, worms, etc., should be sent to the Central Medical Department Laboratory for confirmatory identification. The museum supply will be drawn from this concentration point.

12. *Missiles.* For the psychic effect a missile removed from the body of a wounded soldier may be given to him if he wishes to keep it. However, he *may* be induced to relinquish his claim when the scientific value of the comparative study of such missiles and their preservation in a museum is explained to him. The place and character of all missiles in amputation material should at least be accurately described, and, if possible, sketched. All missiles and foreign bodies removed at autopsies should be carefully preserved, if possible in situ, with the pathologic specimen. When it is necessary to remove them, their location and wound effects should be minutely described, the description, if possible, being accompanied by photographs or sketches.

13. *Armor.* Armor, such as helmets, or other protective body covering showing the effects of missiles, gases, etc., should, whenever obtainable, be preserved with full data concerning the incidents of their use, and shipped to the nearest concentration point.

14. *Instruments and Apparatus.* All instruments and apparatus of special value, which have been developed or materially modified in the A. E. F., should be photographed, accurately described, and, if it seems desirable, models made and sent to the nearest concentration point.

15. *Cast and Models.* The number of skilled cast and model makers in the A. E. F. is extremely limited. When a medical officer has some specimen, or series of specimens or cases, showing results of operations which he wishes to have illustrated in wax or plaster, he should make application to the Director of Laboratories, A. E. F., (Museum Unit), A. P. O. 721, for the services of a model maker.

16. *Paintings, Drawings, Diagrams, etc.* It is believed that in many hospital units there may be found men capable of making diagrams and sketches furnishing graphic records of teaching or

historic value to the Medical Department. Well trained medical illustrators, on the other hand, are scarce and their services, to be utilized in an economical manner, must be centrally controlled. Medical officers having material of scientific value, particulary in the fields noted in paragraph two, and who are without the assistance of capable medical illustrators in their hospital units, should apply to the Director of Laboratories, A. E. F., (Museum Unit), A. P. O. 721, to have an artist assigned for temporary duty.

17. *Cinema Films.* There are a few subjects, — e. g., patients with "shell" shock, the technique of new operations, etc., — records of which it may be desirable to preserve in moving picture films. Application for the services of a cinema camerist for this work should be made to the Director of Laboratories, A. E. F., (Museum Unit), A. P. O. 721.

18. *Photographs.* General Order 78, G. H. Q., A. E. F., May 25, 1918, amends previous orders as follows: "The Medical Department, A. E. F., is charged with technical photography connected with the recording of photographic processes of surgical and pathological matters". For the proper discharge of this duty each hospital unit should have on its personnel, either in the laboratory or roentgenographic department, at least one man capable of taking good technical photographs of medical subjects. A standard laboratory photographic outfit should be requisitioned by each Base Hospital not already equipped. It is assumed that all developing will be done in the X-ray darkroom where will be available a ruby light, and all necessary chemicals for development and fixation of plates and prints.

Photographic records should be made of interesting lesions, particularly in the fields noted in paragraph 2, and of those things of medical, surgical, or pathological interest in the hospital which may be of value for teaching, research or for their historical connection. Copies of these should be forwarded by mail or courier to the Central Medical Department Laboratory, (Museum Unit), A. P. O. 721, as soon as made, and the negatives reserved for subsequent shipment to the most accessible concentration point.

18. *Radiographs.* Radiographs, especially those in series or illustrating wound conditions or their treatment which may be of value for teaching, should be copied in prints or lantern slides, which should be forwarded by mail or courier with full data to the Central Medical Department Laboratory, (Museum Unit), A. P. O. 721.

19. *Original Publication.* All pathological specimens, casts,

models, paintings, drawings, photographs, radiograms, etc., should be accompanied by the name of the medical officer conducting them, and of the medical officer, if any, specifically interested in their subject matter. This is important, not only for the occasional necessity for retracing them back to their origin for additional data, but also that the privilege of original publication of the data by the officer with whom they originated may be respected.

20. *Supplies.* All requisitions for supplies will be prepared and forwarded by the Medical Supply Officer of the hospital unit. Requisitions for laboratory supplies only will be made in quadruplicate, one copy being retained and three copies forwarded to the Director of the Division of Laboratories and Infectious Diseases, Office of the Chief Surgeon, A. P. O. 721, and it is desired that, as far as possible, requisitions be timed so as to permit shipment thereupon to be included in larger shipments from supply depots on ordinary requisitions. These special requisitions, therefore, should be sent approximately ten days prior to larger requisitions contemplated and should bear notation that shipment should be held pending the receipt of requisition of general supplies.

EXTRACTS FROM WEEKLY BULLETIN OF DISEASE

Orders Regarding Drinking Water. From Headquarters of a Base Section.

Hereafter all water for drinking purposes, that is not obtained directly from sources approved by the Chief Surgeon of this Base Section, shall be treated with calcium hypochlorite in the proportion of at least one standard tube of the chemical to not over forty gallons of water.

The hypochlorite shall be added in the manner specified by Circular N° 27, Office of Chief Surgeon, A. E. F.

Whenever water obtained from an approved source is placed in a Lyster bag or other container for storage, it shall be treated in the same manner as water from an unapproved source.

When it is impossible to obtain hypochlorite, all drinking water will be boiled at least twenty minutes.

The use of common drinking cups will be discontinued. Care will be taken that men do not drink directly from the spigots of Lyster bags.

The Duties of a Battalion medical officer.

First : *Medical.* A mere doctor is a small man in the army. Pills are not important; commonsense and all the qualities of a man are. He must be a medical officer and must act for the benefit of the State as well as the patient, and differentiate between a slacker and a sick man. In order to do this he must know the man, and in order to know him he must get his confidence and be in sympathy with him. Second : *Sanitary.* In teaching sanitation we must remember a regimental medical officer must teach it to every man in the battalion, from the commanding officer down to the last private, and in order to enlist interest in sanitation intelligent men should be given a reason for rules. Third : *Constructive.* The medical officer must provide the place and facilities for the care of the sick and wounded; Fourth : *Supervision.* The regimental medical officer is the show horse by which the corps is judged. He must be tactful, with ability, and enjoy good fellowship with men without losing his personal dignity. He must be an example to his men, honorable, brave and upright. Above all he should be sympathetic and secure the full confidence of the men. He should be a leader in the social, moral and military hierarchy.

Sanitary Details.

A. General Order Issued From the Headquarters. Base Section 2 directs Camp Commanders in the Section to furnish daily sanitary details to the Camp Surgeon in the following numbers in proportion to the strength of the Command :

Up to 1,000	— 2 0 0	of entire Command
1,000-5,000	— 1.1 2 0 0	" "
5,000-10,000	— 1 0 0	" "
10,000 and over	— 1/2 0/0	" "

For all other troops and detachments two men per organization will be furnished.

This provision should enable camp surgeons of that section to control fly-breeding and feces disposal. Fly carriage of feces seems to have been responsible for the spread of dysentery at various ports in Base Section 2.

Prevention of Respiratory Diseases.

Sanitary report from England, " Respiratory diseases, colds and bronchitis, have prevailed during June because of damp weather

and soggy ground. " Sanitary report from the south of France, " Respiratory affections common because of the extreme dryness and dust throughout the month. "

Has the man and his habits nothing to do with the catching of colds and the acquisition of respiratory infections. Seek the common factor elsewhere than in climate. Is not human contact, that is, sneezing, coughing, spitting in close quarters, at least in part responsible. The weather is hard to control, but men's habits and surroundings can be modified by *Education and Action*.

A Word to the Wise (Sanitary Inspectors). Just ask a few men with one gold chevron on their left sleeves, or if you can catch a man with two, ask him how he dried his shoes, his coat, nay his very undershirt last winter. Certainly not by hanging it on a fence in the sun. The fences were frigid and the sun went altogether out of the heating and drying business from October to April. Slush, sleet, continuous drizzle and mist kept the A. E. F. wet, day and night, and *cold*. Please sit up and take notice and get drying rooms, closets, boxes, any old place near a stove pipe or an incinerator ready for wet weather. We lost many a splendid fellow from pneumonia and empyema last winter and had our hospitals full of sick because men had to sleep often in wet clothes and shoes. A pair of pipe pliers is an awkward tool to put a pair of frozen boots on with. The newly arriving divisions and those who see this land in sunshine are too easy with themselves when they send in sanitary reports claiming adequate facilities for drying clothes, " lines between barracks ", " fenches behind the kitchen ". In the long weeks ahead when France goes through the black cold tunnel of winter, provision must be made for drying clothes day and night.

Also, bathing in the river and washing socks by the brookside have no attraction in December, and the man who takes a hot bath under orders once a week whether he needs it or not must have his water indoors.

Standard Preventive Measures.

As a perpetual precaution against many infections beside typhoid fever, the following note from the 1st Depot Division is well worth following. Much influenza and kindred infections would be prevented if messkits were thus sterilized: " Heretofore, messkits were being washed in two large containers of water, one soapy and the other clear. Repeated bacteriological examinations revealed the fact that this soapy water after its use was nearly sterile, while the latter, or clear water, showed 5 or 6,000 colonies per c.c. So the

following plan was adopted in each kitchen : First, one large container filled with a hot, strong, soapy solution of clean water; Second, a large container of hot, clear water; and Third, one container was placed over fire and kept boiling while the men were using it. "

Carrier Rate among Meningitis Contacts in the... Division : Fifty cases of cerebrospinal meningitis in the division since Aug. 1917. All carriers left in U. S. when the division "came over". after culture of the entire command. Carrier rate before leaving U. S. 1.5 o/o-2 o/o, two cases of meningitis July 16 and 17, 1918, in one Infantry regiment, and two more on July 19 and 22 in another Infantry regiment. Seventy-three contacts of the above four recent cases thoroughly and repeatedly (3 times) cultured July 23-Aug. 2, 1918, and plates prepared in the spot and carried warmed to the Central Medical Laboratory where they were put in incubator within one hour after swabbing. *All contacts found negative for meningococci.* Such briefly is the history of a divisional problem and the not unexpected result of a midsummer culturing of noses and throats of men living an out-door life. If we had as much fresh air in winter, and treated acute colds as if they were serious communicable diseases, we should have similar though probably not such a 100 o/o result.

Meningococcus Serum.

Bulletin of Diseases N° 14 contains the following sentence : " If the meningococcus is not found on smear or culture, it is well to be satisfied with withdrawal of fluid and not to give serum ". In a certain number of cases of epidemic meningitis, the meningococcus is not found on smear. Cultures take at least 24 hours and cannot be waited for, as early treatment is a most important consideration. The sentence in question should read : " Serum should not be administered unless a purulent fluid, or a fluid showing marked increase in leucocytes is withdrawn ".

Osler contains the following sentence : " Whenever the fluid obtained by lumbar puncture is purulent the serum should be given, but repeated only if the meningococcus is found ".

Anthrax Controlled.

Measures taken in the United States to prevent the manufacture and distribution of shaving brushes made from anthrax infected bristles and hair appear to have been adequate. There were reported in March, 2 cases of anthrax; in April, 5; May, 8; up to June 17th, 8 cases; June 17th to July 21st, no cases.

Facts About Trench Fever.

Prevention now entirely practicable upon the basis of scientific proof of source of virus and means of transmission.

The following conclusions have been officially endorsed by the committee of medical officers of the British and American Expeditionary Forces called to consider the results of the experimental clinical and laboratory investigation carried out upon the subject of Trench Fever. The clinical subjects were all volunteers from the enlisted men of the Sanitary Corps of the Medical Department, U. S. A.

1. The organism causing trench fever is a resistant filterable virus.

2. The virus causing the disease is present not only in the plasma of the blood but in the urine, and sometimes in the saliva or sputum of trench fever cases.

3. The disease is transmitted naturally and commonly by the louse Pediculus humanus, variety corporis; the louse may transmit the disease by its bit alone, or the disease may be produced artificially by scarifying the skin and inoculating the scarified area with a small amount of the infected louse excrement.

4. The louse need only remain upon an individual for a short period of time in order to infect him with trench fever, and a man may be entirely free from lice at the time he develops symptoms of the disease.

A series of inoculations relating to the thermal dead point and the resistance of the virus of trench fever have been made and will be reported upon as soon as the work is completed.

Typhus Fever.

A case of typhus fever has occurred in the Advanced Section according to the best opinion of the medical consultants. The patient is from Battery "B", 305th Field Artillery organization. He left his former station at Camp de Souges in the vicinity of Bordeaux on July 5th, where he had been for two months, and during this time was occasionally in contact with Indo-Chinese troops. He first fell sick on July 12th, two days after his arrival. At the time of writing, the fever on the 13th day of the disease is still up. The incubation period of the disease — 12 to 14 days — would make the time and place of infection about July 1st at Camp de Souges. The necessary and very simple measure of protection by de-lousing was taken at the front area and at the base port. No secondary or suspicious cases have so far been reported. It is well to bear in mind that typhus has within the last two months been reported

from Portugal, and that there is a constant marine commerce through the southern French ports now included in Base Section 7 with countries and peoples among whom typhus is endemic. The season of the year makes the likelihood of its spreading remote. There are some typical features in this case, viz : (1) Large erythematous plaques on the palms and on the soles of the feet: (2) A marked leucocytosis: (3) Lack of mental symptoms. On the other hand, the rash which appeared on the 4th day of the disease and developed upon the trunk seemed characteristic. The temperature has continued high. For sanitary purposes the case will be considered true typhus exanthematicus. *Therefore*, to " Kill the Cootie " is one way of clearing the road to Berlin.

" Whenever a contagious case appears in the command, the Division Epidemiologist is notified. He proceeds at once to this organization and assumes personal charge. He traces the source of contagion, isolates contacts, establishes and releases all quarantines."

" The clothing of all cases of pediculosis and scabies is sterilized at the de-lousing stations by the Sanitary Squads. The clothing of 716 soldiers and 80 prisoners of war had such treatment during the month."

" All troops arriving and departing from this command are examined for venereal diseases, vermin, cleanliness, etc. There are 52 portable bath houses in the division. All men are required to bathe at least once a week. Each bath house is in charge of an orderly from the Sanitary Squad who is unfit for heavier duty. This orderly keeps a roster of all men bathed so that the weekly consolidated report shows all men bathed at least once a week, except, for instance, at the Classification Camp. A large bath house at the latter camp is being constructed so that every man will be bathed and given clean clothing the day he arrives."

Dysentery and Typhoid Diseases of Filth and Personal Carelessness

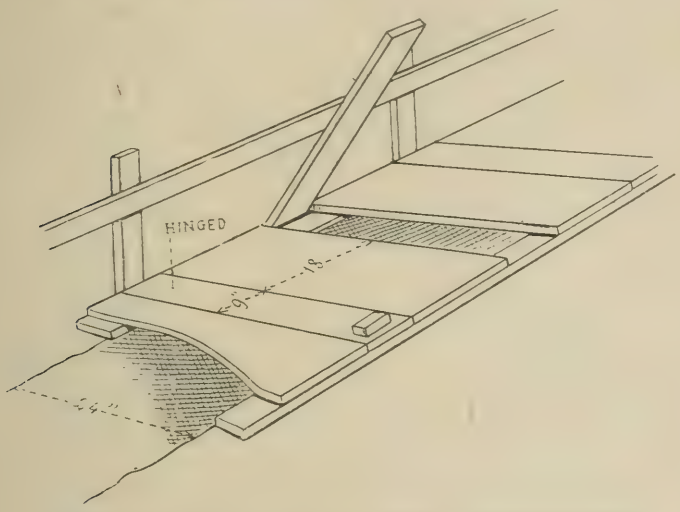
An army, even though vaccinated against typhoid and provided with Lister bags, can not afford to neglect the simple principles of personal cleanliness.

Look at the figures and be warned in time. All the communicable diseases, except those of the enteric group, have reached their lowest level for the year 1918 the past week.

Diphtheria	cases	per	100,000	strength . .	3.90
Measles.	"	"	"	" . . .	3.90
Scarlet Fever	"	"	"	" . . .	1.95
Cerebrospinal Meningitis	"	"	"	" . . .	0.58

In the same week there has been a sudden and striking rise in the incidence of the intestinal infections — Typhoid and Dysentery cases per 100,000 strength 6.04.

Not alarming, but a direct proof, if any were needed, that the men of the A. E. F. are disregarding orders by drinking polluted water without chlorination or boiling, are eating food contaminated by the unwashed hands of cooks or kitchen help, and are exposing feces of carriers or cases of the enteric diseases to flies and human contact, through clothes, shoes and hands during the process of collection and disposal. From November 1917 to June 30, 1918, there were 36 cases of dysentery and typhoid, the dysentery in all but one



Trench latrine cover, squat type, hinged lids, automatic back-stop.

instance amebic and known to be recrudescences of long standing infections, and both diseases appearing simply and in widely separated commands. From July 1-21, 1918, there have been already imported 52 cases of typhoid representing two (2) distinct epidemic groups and 00 cases of dysentery, a majority being of bacillary origin, and 13 being in one focus.

Vaccination against typhoid and paratyphoid, however thorough, will not protect a command against massive infection due to conveyance of feces pollution direct to food or water. Artificial or natural immunity will break down under heavy infection.

To be done now. 1. Look over Records of Vaccination and where necessary revaccinate.

2. See that all water sources are labeled safe or dangerous, and the latter chlorinated before use. That means test water supposed

to be chlorinated in Lister bags or water carts frequently to insure chlorination without excess or offensive dosing. Demand such policing of water sources, carts, and bags as to make the control of drinking water real and not merely theoretical. Water out of a brown canvas bag has no particular merit unless hypochlorite has been added as ordered. Sucking the nipples of a Lister bag in the absence of a cup is poor, however clean the sucker may think his mouth is.

3. Put feces out of reach of flies, food, and water as promptly as possible. It takes brains as well as G. I. cans to do this.

4. Demand clean hands and short finger nails and clean outer clothing of cooks and those who serve food. Have a basin and soap and water outside the kitchen and insist upon hand scrubbing before entering kitchen, especially after a trip to the latrine.

To quote from a valuable Bulletin on dysentery issued to medical officers in Base Section 2 on July 1st, " Every case of acute diarrhoea with pus or blood in the stools should be regarded as dysentery until proved otherwise. Before the specimen of stool starts for laboratory the diagnosis must be made, treatment instituted, measures to prevent spread taken, patient screened, stools disinfected. A medical officer will be judged by his morbidity rather than by his mortality rate. "

The epidemic of typhoid in the Camp Cody Replacement Detachment Co. apparently had its origin before arrival in the A. E. F. All the men have completed vaccination records. The epidemic of dysentery in the 36th aero squadron was due to the Flexner bacillus. The importance of the subject of the dysenterics can be measured by the following extracts from French and German medical publications.

Bacteriological diagnosis unsatisfactory.

" The bacteriological diagnosis of dysentery during the war has been unsatisfactory; numerous epidemics, large or small, have been reported in which the bacteriological examination of the feces has failed to be of any help at all or has revealed dysentery bacilli in a very small percentage. Thus Dorendorf and Molle were able to isolate the Shiga-Kruse bacillus in 6 cases only out of 1,000 stools containing mucus examined in an epidemic in Galicia. In the second half of 1916 Schweriner made an extensive investigation on this subject and obtained a positive result in 18 per cent. of the cases examined. Dysentery bacilli are rapidly overgrown by saprophytes and so examination of the stools becomes progressively negative as time goes on; thus in cases examined within the

first four days of disease 57 per cent. were positive, between the fourth and twelfth days 28 per cent., and in cases examined later 12 per cent. This bacterial overcrowding is favored by heat and can be considerably retarded by packing in ice the feces sent for examination."

"A camp epidemic of bacillary dysentery was investigated by Lesieur, Pellagot and Jacquet in the VIII military area of France which had been free from the disease since the summer of 1916, when there were 78 cases with 2 deaths at Bourges. The evidence showed that the epidemic was not due to contamination of the food or water supply, but that it depended on defective arrangements in the removal and emptying of pails containing the dejecta. The latrines belonging to the conscripts of 1918 were also used by some dysentery carriers and in this way the contents of the pails were able to spread the disease. In the previous epidemic of 1916, reported by Durand, the spread of the disease also appeared to be due to a defect in the arrangements of emptying the pails of the latrines. When proper methods of collecting, emptying, disinfecting and cleaning the pails were established the epidemic of 1917 came to an end."

"In the epidemic of bacillary dysentery at Brest in 1916, investigated by Lancelin and Rideau, the majority of the cases were due to infection with Flexner's bacillus and were less severe and less toxic than those due to infection with the Shiga-Kruse bacillus, but, on the other hand, the Flexner bacillus cases were unfortunately prone to become persistent and chronic."

Dysentery Widely Prevalent in Germany.

"On account of the prevalence of intestinal catarrh in Berlin, Schwee made inquiries from various medical men as to the incidence of the disease in Germany. The replies showed that dysentery was widely prevalent, especially in the Western and Eastern districts. In many cases Hiss's Y bacillus and in rare instances the Shiga-Kruse bacillus were cultivated. Simple, usually apyrexial, catarrh occurred mainly in North Germany, but was also present in the South, both in the civilian and military populations. By some it was ascribed to the usual dietetic factors and the summer heat, by others to the bad effect of war food, especially the bread. According to Strauss, of Berlin, most of these cases are due to an attenuated dysentery or paratyphoid infection, which are related to the war in two ways: a through the numerous carriers of these infections returned home from the front; b from the diminished resistance of infection due to mal-nutrition and the irritation of

the intestine by coarse food. Most of the outbreaks may be regarded as connected with the war, especially from the greater consumption of indigestible or decomposed food. "

Act on Clinical Diagnosis : Many medical officers are awaiting a laboratory diagnosis of specific bacillary dysentery before taking any special precaution to avoid spread or communication of the disease in the command. The warning and advice in Weekly Bulletin No. 15 should be followed in every instance. "Every case of acute diarrhea with pus or blood in the stools should be regarded as dysentery until proved otherwise. Before the specimen of stool starts for the laboratory the diagnosis must be made, treatment instituted, measures to prevent spread taken, patient screened, stools disinfected." The incubation period of bacillary dysentery is often as short as two days and rarely over four days. It takes at least four days for the laboratory to make a complete identification of the organism, during which time a whole new generation of cases may readily have developed unless instant action follows prompt clinical diagnosis.

Cultures from Enteric Cases.

To commanding officers of hospitals, and for the attention of bacteriologists. A culture of the etiological organism isolated from cases of typhoid, paratyphoid A or B, bacillary dysenteries, or patients of the enteric group considered clinically as cases of the above named diseases should be sent by the bacteriologists of hospitals to the nearest Base Laboratory, or, if more convenient, to the Central Medical Department Laboratory, for verification, study and reference. The cultures should be sent as promptly as practicable, and by courier, if possible.

Food Topics.

In spite of the routine and very rosy picture of food preparation and supply painted by the sanitary inspectors in their monthly reports, the following description is nearer the truth and suggests the need of a bit more imagination on the part of medical and line officers. In spite of the ubiquitous motor truck and the occasional passenger car, the army still walks on its belly. Improve the walking and quicken the pace.

Messing Conditions.

There has been almost everywhere a distinct lessening of attention to the mess on the part of company officers compared to what existed in the States before the troops came over here. This is

due in part to the conditions under which the troops live, especially in the billeted areas; in part to the intensive training of the officers in the technical side of the their work, and lack of time or attention to mess duties. The lack of accountability from the issue of the ration in kind has also had its effect in this direction.

Common defects are : (*a*) lack of attention to mess accounting and failure to attempt any saving at all; (*b*) lack of discipline in the kitchens, carelessness about cleanliness, lack of menu posting and checking by competent officers, lack of balance in menus and conspicuous lack of fruits or desserts, tendency to repeat standard stews and heavy dishes, failure to observe the value of palatability in menu and service, waste of food, large garbage waste, potato peeling everywhere, waste of fuel in many places, little use made of bones or soup, few renderings of fat on a scale suitable to get most out of the ration, lack of initiative on the part of cooks and mess sergents, no cook uniforms, etc., etc.

Inefficiency and wastefulness on the part of Company Cook.

Under this heading should properly be included the almost universal practice of using lard and bacon grease as fuel rather than as food. Cooks have informed me that this is required by the absence of sufficient fuel; the dirty and unsanitary condition of many kitchens; the remarkable lack of interest in food conditions and their improvement on the part of company commanders. Every possible effort should be made to arouse an interest in the improvement of kitchen administration and sanitation by company commanders. A division bulletin calling their attention to the military importance of these matters would seem desirable.

Reduction of waste in the messes.

1. Scrape or boil, and then peal, potatoes to avoid waste by paring.

2. Use up left-over potatoes in hashes.

3. Cut bread in fairly thin slices and cut the seconds in half slices. Allow the men to repeat as often as they desire. Frequently, however, on second helping a man wishes only half a slice of bread, and if he must take a whole one, the balance is wasted.

4. Hang the waste bread in a flour sack. It will not mould and as it dries out the dried bread can be used for many purposes beside bread pudding. For example, mixed with salmon for croquettes, mixed with butter for hot cakes, thickening gravies, bases of various forms of desert, with consequent saving of flour, etc.

5. The bean component adds a vegetable if properly flavored with bacon.

6. With the amount of meat and bacon issued the cooks should be able to secure by rendering a sufficient quantity of dripping to do all their frying and even a large portion of their pastry. In fact the lard component should be saved.

7. In serving food on the mess kits, it is very important to see that unappetizing messes are not piled on the mess kits. Often good food is spoiled and made repulsive to men by this action alone, with consequent waste.

8. Men will eat soups frequently and like them if they are well seasoned, thickened, and toasted bread croutons served in them. This use of soup means saving of the bone marrow, an increase in the bulk of the ration with reduction of meat consumption, and a way to use up old bread.

9. See that water is always available, for many men drink coffee simply because it is the only beverage available.

10. When bones are rendered see that they are cracked and boiled at least six hours. The stock may be used for gravies as well as for soups. A good gravy well blended is a great addition, one with raw flour unblended is pure waste.

11. The servings should be inspected frequently by a commissioned officer to see that the helpings are not too large. Permit as frequent seconds as you wish, but do not put more on at first than the least hungry can clean up.

N. B. — And this will also help — Good news from the Quartermaster Corps : — " Authority is granted for Division Quartermasters to purchase locally, with the consent of the French authorities, such fresh vegetables as may be obtainable at reasonable rates, corresponding reductions on ration returns to be made in the fresh vegetable component of the ration. "

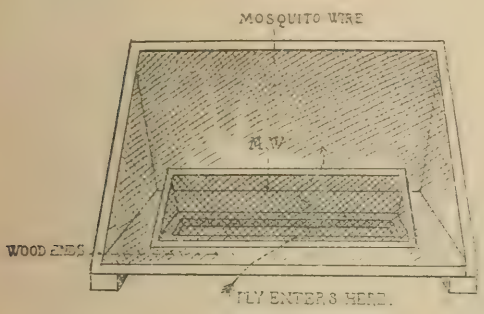
Pigs and Garbage.

It is recommended, in all camps where it is impracticable to dispose of garbage otherwise than to sell it to the farmers, that pigs be purchased by these camps to eat their own garbage. Eight pounds of garbage will furnish one day's ration for one pig and will produce one pound of fat, worth at present price about 25 cents. This makes the garbage worth 3 cents per pound, a figure which cannot be obtained elsewhere except from a garbage disposal plant.

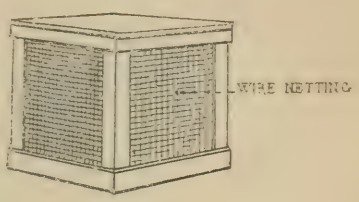
Sound advice concerning unsound meat.

" During the past few months, owing to difficulties in transpor-

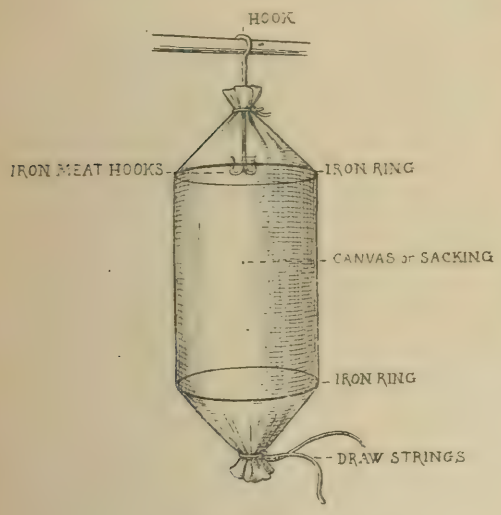
tation, it has been impossible to keep fresh beef frozen until delivered to organizations and some "sweating" or even decomposition has taken place. In many instances whole quarters of such



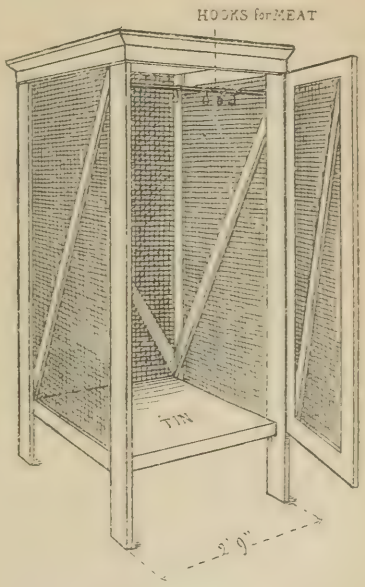
Fly trap of wood and wire netting or tightly stretched cheese cloth. Small inner chamber provides crack 1/2 inch wide at top for entrance of flies to large outer chamber. Left over meat trimmings or piece of crust with a bit of molasses serves as a good bait under trap.



Biscuit Box.



Fly-proof meat bag, made of washed potato-sack, two iron hoops and a hook.

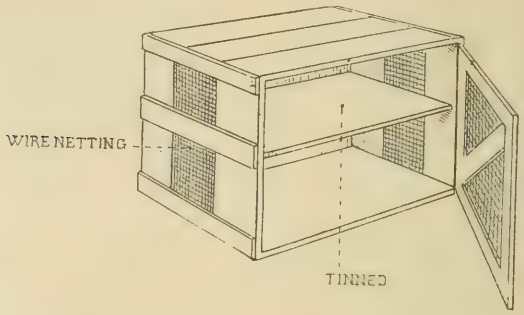


Types of meat safes now in use in A. E. F. inexpensive, practical, effective. Walls may be made of waterproof roofing paper, cheese cloth mosquito netting or wire net.

beef have been needlessly condemned on the advice of medical officers, whereas all that was necessary was wiping or washing with salt water or careful trimming of the parts in which decomposition may have taken place. While it is important that unsafe

meat be not eaten, much of the meat condemned as decomposed is wholly safe and good. Meat is fortunately now being delivered in excellent condition, but the following suggestions are given to enable officers to save as much as possible if occasions arise.

Whenever a quarter of beef is suspected of taint, first thoroughly wash the quarter with salt and water, examine the exposed sur-



faces, and if those are tainted cut off such portions as are affected. If the covered surfaces seem to be affected have the butcher remove the covering tissue, taking care not to cut into the flesh. Do not condemn any part of the beef until these preliminary steps have been taken.

To determine whether decay has started within the beef, introduce a probe at the shoulder and hip joints; by the smell at the end of the probe you can determine whether the joints are affected or not. If they are affected, dissect out the bone and trim away the adjacent meat until a sound layer is reached. In no instances is it desirable or necessary to slash the quarter, the object being removal of affected parts with as little waste as possible. To prevent fly-blow make sure that fly eggs are immediately washed off when the beef arrives; these are found usually on the shank. Medical officers should also recognize that there are no absolute tests available for meat spoilage and they are advised to make use of the experience of qualified butchers in the organizations in determining the extent of spoilage.

The following methods are recommended for the best care of frozen beef : — It is better to hang beef in an airy, well-ventilated place out of the direct rays of the sun, rather than to store it in damp, dug-out refrigerators. Meat safes, covered with cheese cloth to exclude flies and with free access of air, will protect the beef for several days if it is wiped as frequently as moisture accu-

mulates on the surface. If it is necessary to retain cut-up beef for more than 24 hours it may be placed in a container and covered with salt and water, but in cutting up beef require the butcher to first remove any tainted outer skin before he cuts into the meat. This avoids the carrying of the decayed portion into the sound meat.

When fresh or frozen meat is received in larger amount than can with advantage be cooked before heat and flies cause deterioration, it is advised that the meat be cut from the bones and be covered with brine in a small barrel cask, or earthenware crock.

The Clinical and Therapeutic Aspects of Gas Poisoning.

(Extract of lecture delivered by Colonel H. L. Gilchrist, Medical Director of Chemical Warfare Service).

Summary of Clinical Pathology following Phosgene.

In considering the action of lung irritants, the fact must not be lost sight of that the action of any gas depends — First, on the concentration of the gas to which the men are exposed, and Second, on the physical condition of the men.

Two classes of cases can be expected; first the fatal cases and second the serious cases.

1. *Fatal Cases* are confined to the class of men who are subjected to a strong concentration of a strong lung irritant, such as phosgene, without masks. As a result horrible death follows. Death in these cases may follow acute pulmonary oedema, and in certain cases cessation of the respiratory reflexes. As a rule, cases of this kind die in the trenches and never reach the dressing station. The first symptoms of weakness and irregular respiration are immediately followed by pulmonary congestion and asphyxia.

2. *Serious Cases.* The serious cases develop more slowly, as a rule, the patients being exposed to toxic atmosphere during sleep. The first action of the irritant gases is manifested by irritation of the eyes and throat. The alarming features are sudden difficulty in breathing and violent contractions of the throat and thorax. The patient complains of oppressive muscular weakness. If he is walking at the time, he stops, sits down or may perhaps fall prostrate to the ground.

Pulmonary Symptoms. These may seem startling. As an example, an officer was exposed to a small quantity of phosgene gas, following which he experienced no serious effect, and retired for the night. On the following morning he arose, feeling in his usual good condition, and he proceeded to his mess tent for lunch. When the meal was over he arose to light a cigarette, fell to the

ground with bloody froth flowing from his nostrils and lips, and within a few minutes died of acute pulmonary oedema.

Another example : after an intense bombardment with lung irritant gases a sergeant went forward looking after supplies, etc., following which he descended a small incline and entered his shelter where he was overcome by a paroxysm of acute suffocation. Cyanosis steadily developed, and in less than half an hour he died of asphyxia unaccompanied by expectoration.

The French report several cases where field hospital patients presenting no serious symptoms on arrival, left their beds and were permitted to walk around. Later they were taken with progressive dyspnea, followed by cyanosis and death.

At times the cause of death in these cases is not at all apparent. Patients who, on arrival, manifest no symptoms during auscultation are frequently found, a few hours later, to present asphyxial symptoms, and a further examination shows all the signs of advanced pulmonary oedema.

In the clinical study of gas cases the following stages may be considered : (a) *Complete and acute pulmonary oedema*, followed by death in from a few hours to two days. The rales steadily increase from the onset of symptoms. (b) *Acute, but not fatal, pulmonary oedema.* This stage is followed by lobar or lobular pulmonary congestion especially at the base of the lungs. The large bubbling rale of bronchitis is heard and, little by little, congestion, bronchitis, and ephysema indicate lesions of the respiratory system. (c) *Successive manifestations of pulmonary congestion.* From hour to hour new congestion foci appear. The evolution of congestion may extend through a period of several days. This is especially true for intoxication by Palite and Chlorpicrin. (d) *Simple Bronchitis.* Although simple bronchitis is relatively rare, being confined to light cases, serious affection of the whole bronchial system may bring on advanced dyspnoea and important subjective disturbances.

Arsenic Gases. New clinical Picture.

The enemy is now using arsenic in the form of (a) ethyldichlorarsine, (b) diphenylchlorarsine, and (c) diphenylcyanarsine; often used with mustard gas (a) can be detected by faint fruity odor; (b) and (c), the latter especially effective in low concentrations, have a pungent smell. The obscure symptoms have misled M. O. s. Be on your guard for :

Dizziness and transient unconsciousness, *lethargy* often 12-18 hours (2 cases comatose 3 hours, one with hallucinations), smarting

of eyes, nose and throat, no acute pain, mild conjunctivitis. Conjunctival reflex delayed. Pupils dilated in severe cases. Burning sensations over face, no flushing or cyanosis. *Tightness* in chest, slight bronchitis, huskiness and choking, respiratory rate normal. *General* weakness and fatigue with or without nausea and vomiting; low tension, slow pulse; grip weak; legs weak; anesthesia hands and soles of feet decreasing above; present also over upper chest from and back, but not on, abdomen; epi-gastric reflex and ankle colonus present, K. J. absent.

Two or three days later; lethargy decreasing. Pupils dilated react slowly to light, no ocular palsy or nystagnus. Husky voice persists. Elbow jerk greatly exaggerated. Superficial reflexes, epi-gastric, cremasteric, plantar present. Delayed sensations of heat and cold. Others show marked nervous symptoms at Base, but not at Advance Dressing Station. Most cases apathetic, suffer dizziness on standing, lost co-ordination and sense of position; arms and legs weak, gait tottering and shuffling pain in legs when walking but not on pressure over nerves. K. J. rarely normal at first; later sluggish. Improvement usually rapid. In another group, showing at first ordinary symptoms of mustard gas poisoning, some showed indefinite weakness, anesthesia or analgesia (characteristic of chlorarsin) after 8-10 days. Still others ran T 102° F-104 F; P 106-116; R 22, the T returning to normal in 48 hours and possibly due to complications. Headache for 8-12 hours common.

Pathology is unknown. Symptoms not due to neuritis, or involvement of root or root zone. Irregularity of symptoms has often raised suspicion of hysteria. Toxic effect central rather than peripheral. Arsenic is said to be found occasionally in urine. Statement needs confirmation.

Sources. Contamination of shell hole or other battle area water sources by gases suspected.

Mustard Burns of Eye.

Treatment of burns of the eye caused by gas (mustard). The eyes should be thoroughly washed out at the earliest possible moment with an alkaline solution such as sodium bicarbonate 1 o/o. While the irritation persists they should be irrigated two to five times daily with a bland solution, normal salt, saturated boric acid or 1 o/o sodium bicarbonate. When the irritation is severe, one or more drops of liquid albolene or olive oil should be instilled after each irrigation. In the severer cases involvement of the corneal epithelium is common and there is a varying degree of photophobia. All such cases should have sol. atropin sulphate 1 o/o

instilled from one to three times a day to keep the pupil well dilated. The eyes should be shaded in all cases where conjunctival irritation is evident, but not in the functional variety where the conjunctiva is normal. A secondary conjunctival infection, as evidenced by a a considerable amount of mucopurulent secretion, is not uncommon and is best treated by col. argyrol 20 o/o twice or three times a day. An ophthalmologist should be called in to see the more severe cases.

Mustard Gas Effect from Smoking Gassed "Durham" : Pvt. I. W., Co... of the... Infantry, with a shrapnel wound of the right thigh, "rolled his own" from a sack of "Bull Durham" borrowed from a companion who had been gassed. While smoking he remarked upon the gas taint of the tobacco and had to give up the cigarette. Half an hour later definite reddening of the mucous membrane of mouth, lips and adjacent skin was noticeable.

Gas-Masks of Diphtheria Patients : The considerable amount of diphtheria reported in the last three weeks direct from combatant troops at the front brings to mind one quite possible source of transmission of mouth and nose secretions, i. e., the gas mask. Although a gas mask is as much a personal belonging as a tooth-brush, or pipe, generosity and emergency know not sanitary laws. Hence it is recommended that the gas masks of men admitted to hospital for anything except battle casualties, i. e. fevers, or infections, be adequately treated by wiping the rubber mouth piece with antiseptic solution and exposing to the direct rays of the sun for two hours, and so attached to the patients' belongings that they may not be issued to another.

Diphtheria in Gassed Cases. In a hospital epidemic of 19 clinical cases (June 26-July 10) cultures were made from the throats of 566 persons, patients and personnel, and Schick test performed upon 400 persons. Of the 566 persons "cultured" 71 carriers were found: among 18 medical officers 6, 66 nurses 12, 101 enlisted personnel 3, 32 R. C. and French employes 1, ? patients 49. Susceptibles according to Schick test were immunized. The epidemic evidently had its origin in several cases of "sore throat" among the nurses June 8-10, but none of enough severity to require medical attention, and hence not "cultured".

The incidence of carriers developing among the convalescents from gassing was much higher than among other types of patients. The four wards in which most of the positive patient cultures were found were filled chiefly with severely gassed cases.

Tuberculosis Again.

The rarer form of peribronchial tuberculosis can best be detected by, (a) Changed tone of the fundamental note at the base of the chest. This note is elicited by heavy percussion and is shorter and higher pitched than normal pulmonary resonance. (b) The persistence of indeterminate or bronchial rales limited to the root region of the lung, and heard along the sternum and in the interscapular spaces of the same side. (c) *X-Ray Corroboration*: The sputum of any case held because of suspicious physical or X-ray findings should be examined at least 10 times before being declared non-tuberculous. Regimental surgeons and various specialists in Base Hospitals will have many opportunities to detect early cases of pulmonary tuberculosis.

Lacerations of the Lids and Eye-Ball.

The special attention of surgeons is called to the necessity of conserving all possible tissue in wounds of the ocular structures. The eyelids are composed of highly differentiated tissue, which cannot be satisfactorily replaced, and loss of even a small amount of skin or of conjunctiva leads to deformity and interference with the function of the eye. Consequently, debridement, if performed at all, should be aimed to preserve every possible bit of tissue which is viable. The same applies to cases where laceration of the eye is so great that evisceration or enucleation must be performed. In this event, as little conjunctiva as is feasible should be sacrificed, in order that the patient may obtain a socket sufficiently large for the wearing of an artificial eye.

The socket should not be packed with gauze after enucleation. A few minutes' pressure is sufficient to control the very moderate hemorrhage. In the very septic cases a small drain, preferably of rubber tissue, may be inserted, but this is seldom necessary.

As far as possible, all ocular surgery should be performed by the specially trained man stationed in each hospital or in one in the neighborhood.

Control of fleas.

Several sanitary reports mention the flea nuisance as a cause of disturbed sleep, etc. in some of the permanent and temporary barracks in the A. E. F. The following note from the Urologist of the Army Sanitary School may be helpful.

" The flea breeds in the dust and not in the garments of men. It is not, therefore, strictly a body parasite. Stables may be rid of

fleas by destroying their breeding places. An earthen floor should be kept sufficiently moist to keep it packed and hard, and occasionally sprinkled with a weak emulsion of crude carbonic acid. A sprinkling with oil will lay the dust more permanently. Where there is a wooden floor the same principles apply, but it should be remembered that there may be dry dust underneath the boards. After a thorough soaking the cracks in the boards may be caulked with oakum to prevent evaporation. The ground outside should receive similar attention. In my experience these procedures may be relied upon to promptly rid a dwelling or stable of fleas ".

Motor Oil in Sanitation.

No end to the uses of motor by-product. Instead of lampblack and oil, the resourceful sanitarian of the A. E. F. has made this discovery. " Hdqrs. 79th Division, A. E. F. — We find that cylinder oil after being removed from automobiles that have been cleaned, if mixed with kerosene, is very efficacious and suitable for sanitary purposes, especially for latrines and manure piles. Great quantities of this can be saved in their area and can be used for these purposes. Heretofore it has been thrown away and no use made of it. Would suggest that it be tried out in other areas and if found as efficient as we have, that some means be made to keep this material in the Medical Department for sanitary purposes. Division Sanitary Inspector. "

Le Gérant : O. Porée. Paris — Imp. Lahure, 9, rue de Fleurus.